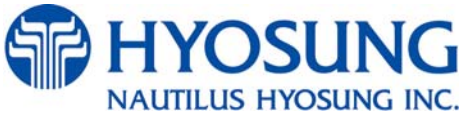
# MoniMax 5600T

# Maintenance Manual




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# Revision Record

| Date | Page | Version | Description of Change |
|---|---|---|---|
| August 2009 | All | 1.0 | New Publication |
| December 2009 | Chapter 12 | 1.1 | Updating Chapter 12. Journal Printer. |
| February 2010 | Chapter 13 | 1.2 | Updating Chapter 13. Appendix. (Error Code Table) |
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# Chapter 1. Overview

## 1.1 Overview

The model MoniMax 5600T (Through-The-Wall Type) is designed to meet the higher transaction volumes and the low maintenance components. Whether installed as a walk-up or drive-through, model MoniMax 5600T offers solid, weatherized construction while its compact architecture allows flexibility in mounting. The MoniMax 5600T ATM is easy to use, easy to service and is able to support customer's needs.

.

This manual is designed to provide maintenance guide for the MoniMax 5600T ATM and provide detailed description of the following:

- System configuration
- Specification of each unit
- Required parts
- Specifications of expendable parts
- Facility specifications

All information described in this manual is a licensed product of Nautilus Hyosung Corporation.
It is the policy of Nautilus Hyosung Corporation to improve products as new technology, components, software, and firmware become available. Therefore Nautilus Hyosung reserves the right to change specifications without notice.

## 1.2 Basic Features

Important features of the MoniMax 5600T ATM is highlighted in the following list:

- 15 inch TFT LCD
  - 1,024 x 768 Pixels
- Keypad (EPP keypad)
- 15.1” privacy filter (Optional)
- Motor Driven Card Reader
  - ISO Track 1, 2, 3 Read
  - EMV Level-1, 2
  - Card Return for power failure
  - Anti-Skimming
- Thermal line receipt printer
  - Loading paper semi-automatically
- Electronic journal
  or Direct Thermal Printing
  or Dot Impact Printing
- Control Electronic (PC)
- Rear access type cash dispenser
  - Automatic shutter type
- UL 291 Level-1 Safety
- Electronic and Key Lock
  or Dial and Key Lock
- Supporting USB Still Camera 1,2
- Supporting Audio guidance by sound (Optional)

## 1.3 Terminologies

◈ CE : Control Electronics
◈ PNC : Panel Control Board
◈ MCU : Magnetic Card Reader Unit
◈ VFD : Vacuum Fluorescent Display
◈ SPR : Slip Printer (=Receipt Printer)
◈ JPR : Journal Printer
◈ CDU : Cash Dispenser Unit
◈ P/S : Power Supply
◈ OPL : Operation Panel and Handling Screen for Customer
◈ SPL : Service Panel and Handling Screen for Operator
(=Enhanced Rear Operator Panel)
◈ IDC : Identification Card Device
◈ PTR : Printer (mainly Receipt Printer)
◈ PIN : Encryption Pin Pad
◈ SIU : Sensor and Indications Unit
◈ TTU : Text Terminal Unit (OPL or SPL)
◈ CAM : Camera Unit
◈ ADA : The Americans with Disabilities Act
◈ EMV : Europay, Mastercard, Visa
◈ VDM : Vendor Dependent Mode
◈ BATT : Battery
◈ Earphone Jack : Voice Converter for Visually Disabled Persons

# Chapter 2. Precautions for Safety

# 2.1 Overview

## Common Precaution for Safety



Precautions outlined this manual provide information on safe and proper handling of the product. Non-compliance of the precautions may result in injury or damage to the product.
This precaution symbol with sample term tells you safety warnings during equipment handlings.

Please read the following instructions before operating equipment.

- Operate equipment in the order outlined in this manual.
- Follow precautions indicated in this manual, as well as the equipment itself.
- Failure to properly address these precautions may lead to injury or damage to the product.
- Avoid operations not addressed in this manual.
- If you cannot remedy system problems using the methods outlined in this manual, please refer to contact information listed in the manual.

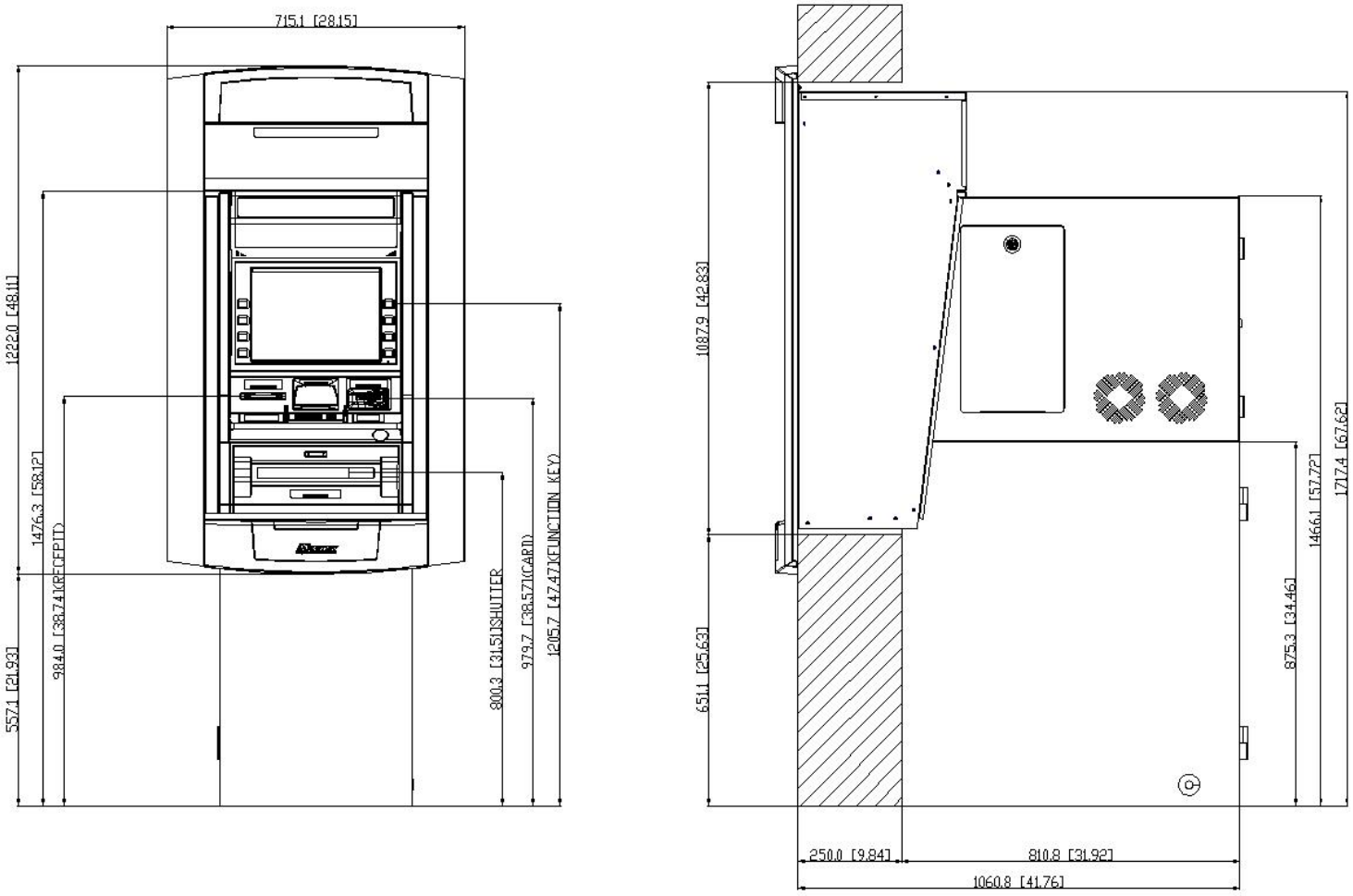
## 2.2 Description of Precaution Symbols

| SYMBOL | DESCRIPTION |
|---|---|
|  | Electrical Shock<br>• Do not remove cover. Only a maintenance engineer is allowed to open the cover.<br>• Do not touch. You may receive electric shock.<br>• Make sure to turn off the power when servicing the equipment. |
|  | High Temperature<br>• Do not touch the equipment when it is running.<br>• The equipment can get extremely hot and may cause a burn.<br>• Make sure to close the cover before running the equipment. |
|  | Be Careful when Moving<br>• The equipment is heavy. Make sure at least 2 people to lift or move the equipment.<br>• Do not attempt to move the equipment alone. You may be injured by dropping the heavy equipment. |
|  | Fire Hazard<br>• Place the equipment in an area away from any combustible materials.<br>• The equipment may catch on fire from overheating or short circuit of the power supply unit. |
|  | Disassembly<br>• Do not disassemble or modify the equipment unless you are a certified engineer.<br>• Contact the service center for maintenance, adjustments and repairs.<br>• Improper disassembly may cause fire or electrical shock. |
|  | Fall down<br>• Do not place the equipment where the floor cannot sustain the weight of the equipment, or on slanted or unstable surface.<br>• Equipment may fall down and cause injury or damage. |
|  | Unplug the Equipment<br>• Stop using the equipment immediately if it smokes, emits an unusual smell, makes abnormal sounds, or if liquids or other foreign materials enter the equipment.<br>• If the above-mentioned abnormalities occur, immediately turn off the power, unplug the equipment and contact the service center.<br>• If you ignore these symptoms, the equipment may catch on fire or cause electric shock. |

# Chapter 3. System Configuration

# 3.1 External Appearance

## 3.1.1 Dimensions




Note : All the unit in the dimension is millimeter.

Fig. 3.1 Dimensions

### 3.1.2 Component Name




Fig. 3.2 (a) Component Location of MoniMax5600T

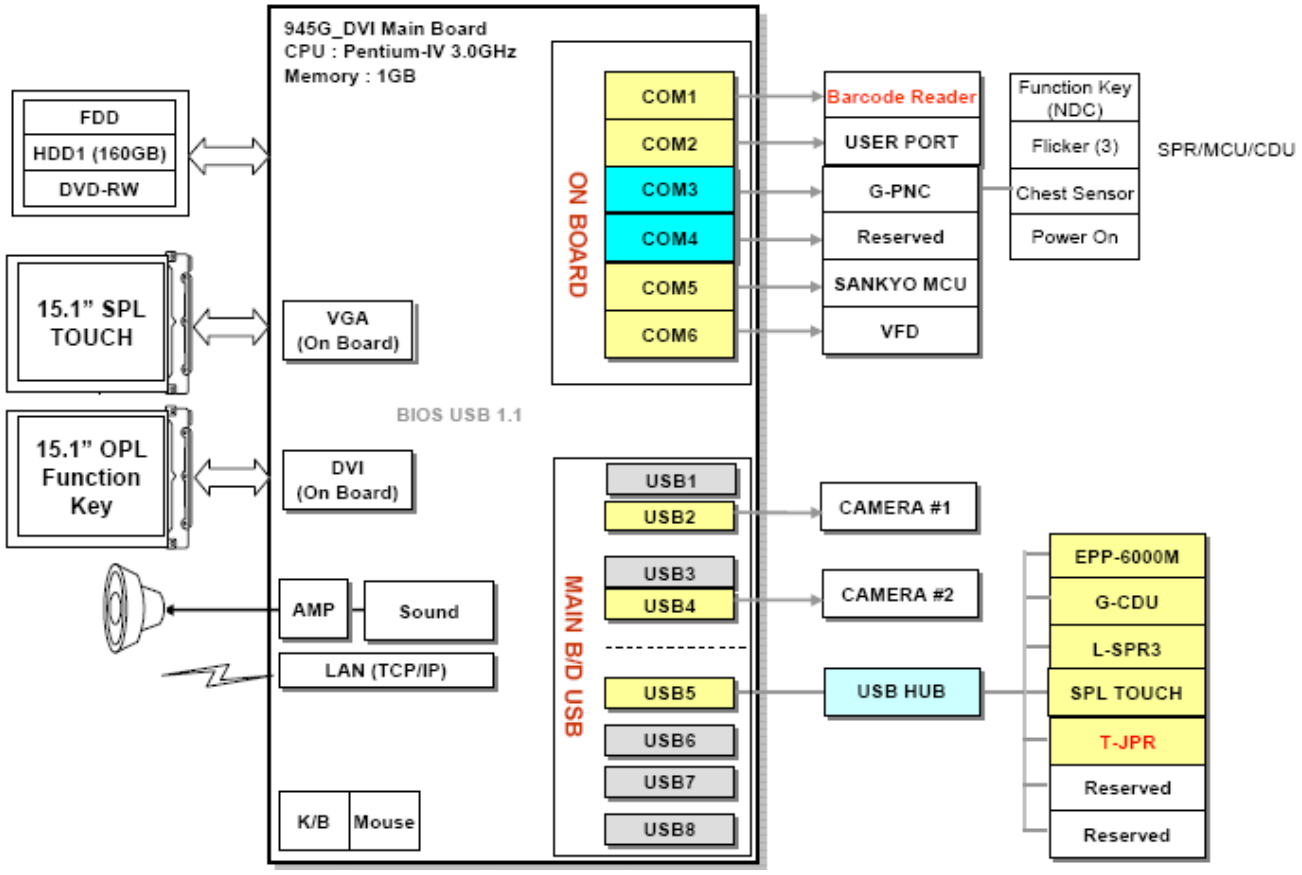



Fig. 3.2 (b) Component Location of MoniMax5600T with Bar Code Reader

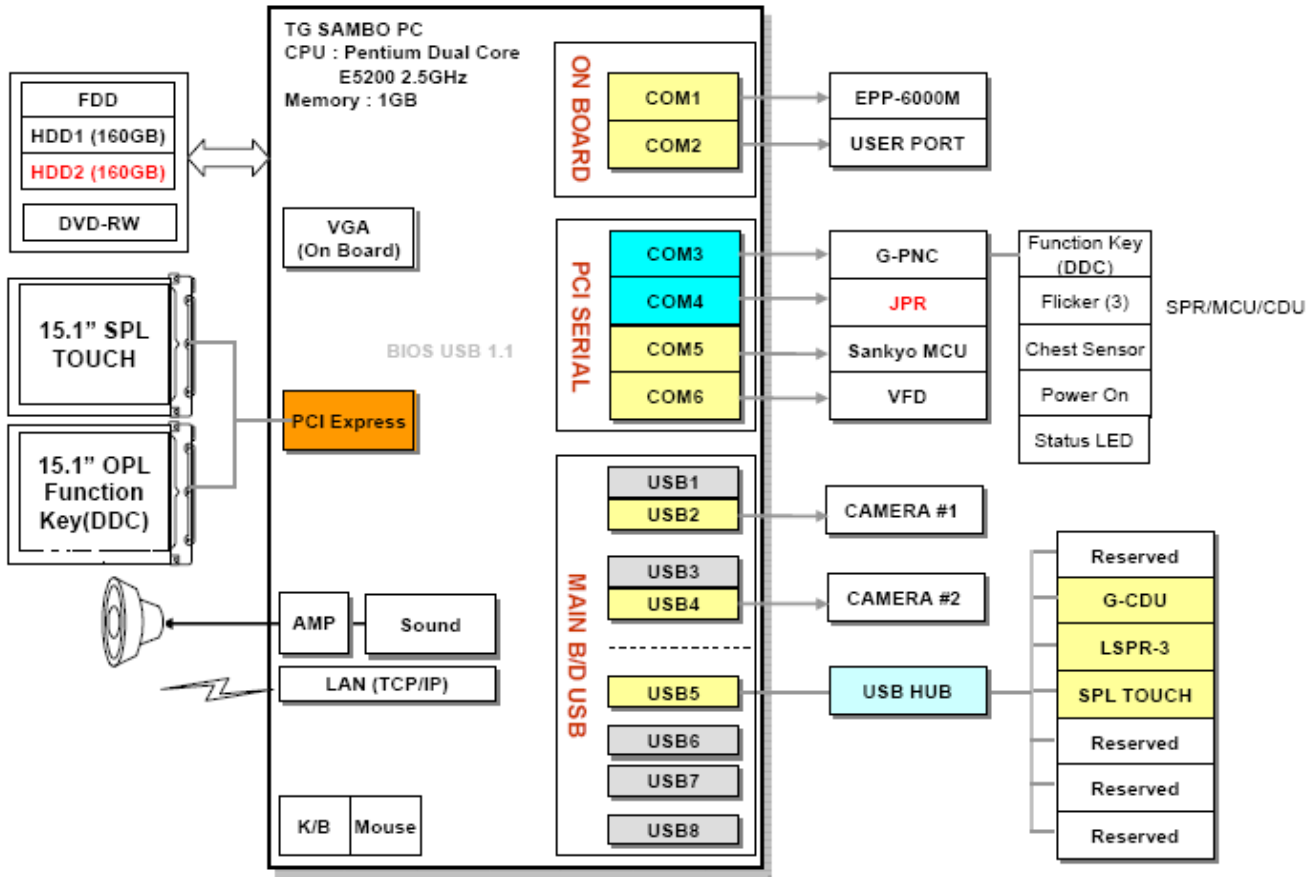
## 3.2 H/W Configuration

### 3.2.2 System Block Diagram

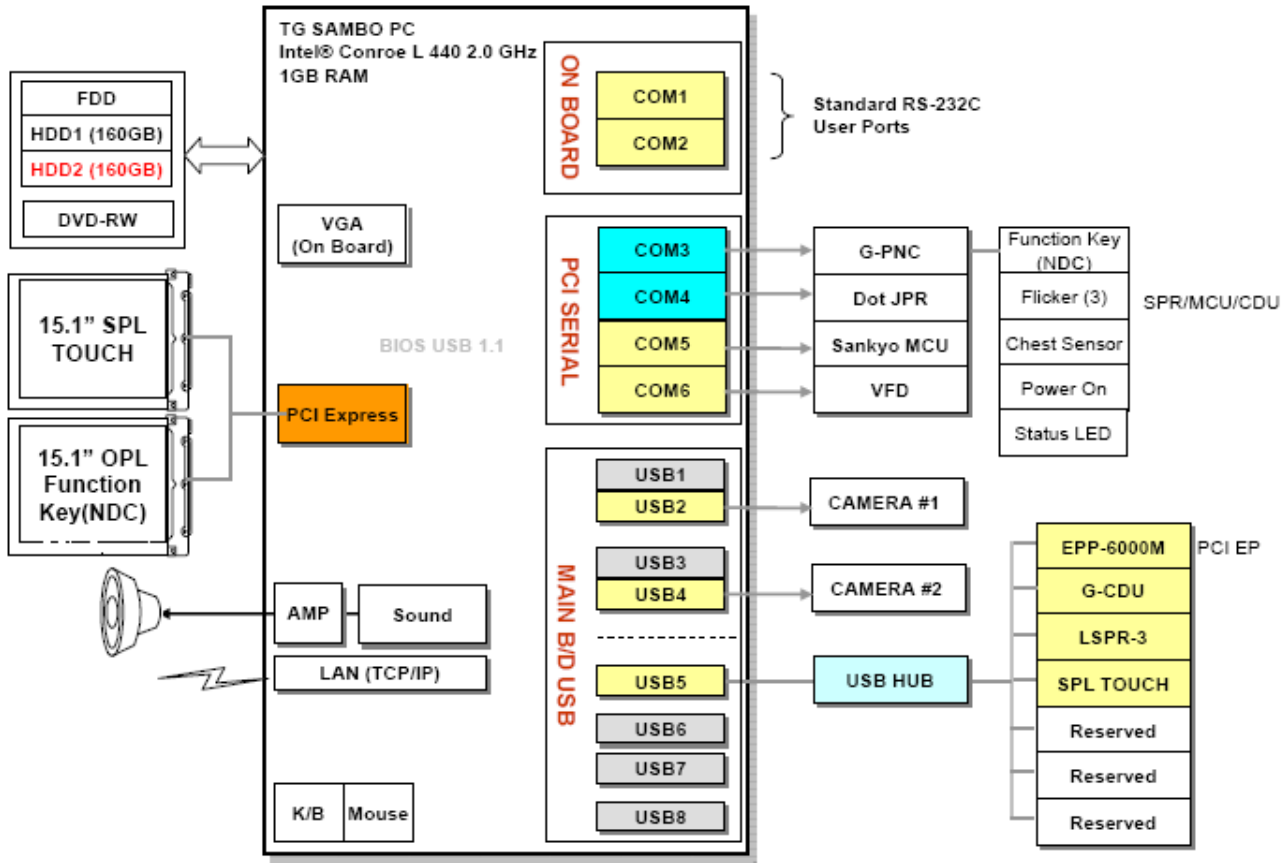
1) IOBP-945G



2) ECS EG31M-1


TG SAMBO PC
CPU : Pentium Dual Core
E5200 2.5GHz
Memory : 1GB
FDD
HDD1 (160GB)
HDD2 (160GB)
DVD-RW
VGA
(On Board)
BIOS USB 1.1
15.1" SPL
TOUCH
15.1" OPL
Function
Key(DDC)
PCI Express
AMP
Sound
LAN (TCP/IP)
K/B
Mouse
ON BOARD
COM1
COM2
PCI SERIAL
COM3
COM4
COM5
COM6
MAIN B/D USB
USB1
USB2
USB3
USB4
USB5
USB6
USB7
USB8
EPP-6000M
USER PORT
G-PNC
JPR
Sankyo MCU
VFD
Function Key
(DDC)
Flicker (3)
Chest Sensor
Power On
Status LED
SPR/MCU/CDU
CAMERA #1
CAMERA #2
USB HUB
Reserved
G-CDU
LSPR-3
SPL TOUCH
Reserved
Reserved
Reserved

3) ECS EG31M-2


TG SAMBO PC
Intel® Conroe L 440 2.0 GHz
1GB RAM
FDD
HDD1 (160GB)
HDD2 (160GB)
DVD-RW
15.1" SPL TOUCH
15.1" OPL Function Key(NDC)
VGA (On Board)
BIOS USB 1.1
PCI Express
AMP
Sound
LAN (TCP/IP)
K/B
Mouse
ON BOARD
COM1
COM2
Standard RS-232C User Ports
PCI SERIAL
COM3
COM4
COM5
COM6
G-PNC
Dot JPR
Sankyo MCU
VFD
Function Key (NDC)
Flicker (3)
Chest Sensor
Power On
Status LED
SPR/MCU/CDU
MAIN B/D USB
USB1
USB2
USB3
USB4
USB5
USB6
USB7
USB8
CAMERA #1
CAMERA #2
USB HUB
EPP-6000M
G-CDU
LSPR-3
SPL TOUCH
Reserved
Reserved
Reserved
PCI EP

# Chapter 4. User Handling Unit

## 4.1. Overview

Basically, the user handling unit is composed of the pin pad that the customers manipulate by themselves, monitor, camera, speakers and associated electronic boards.

### 4.1.1 Component location

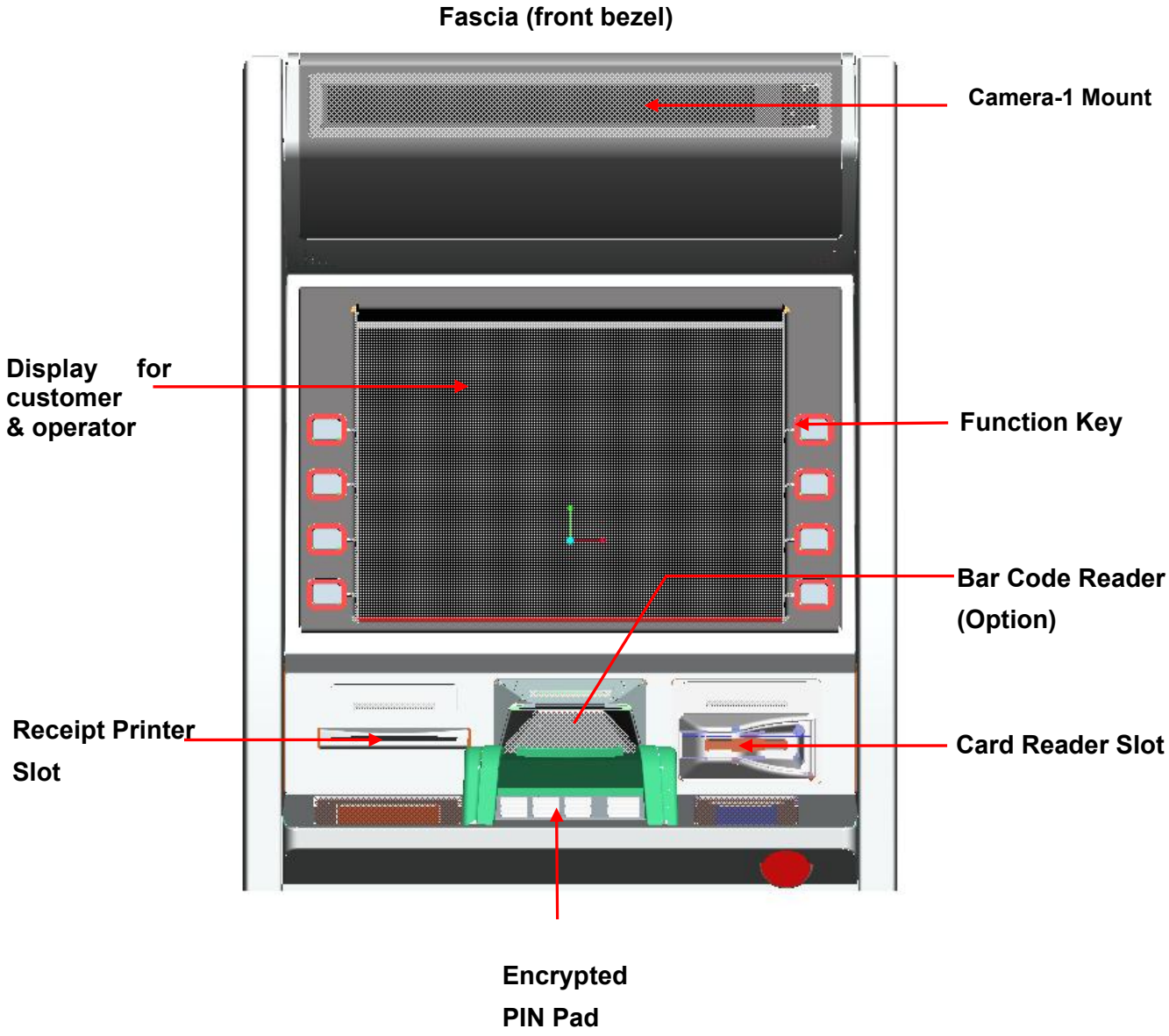



Fig 4.1 The front view of User Handling Unit

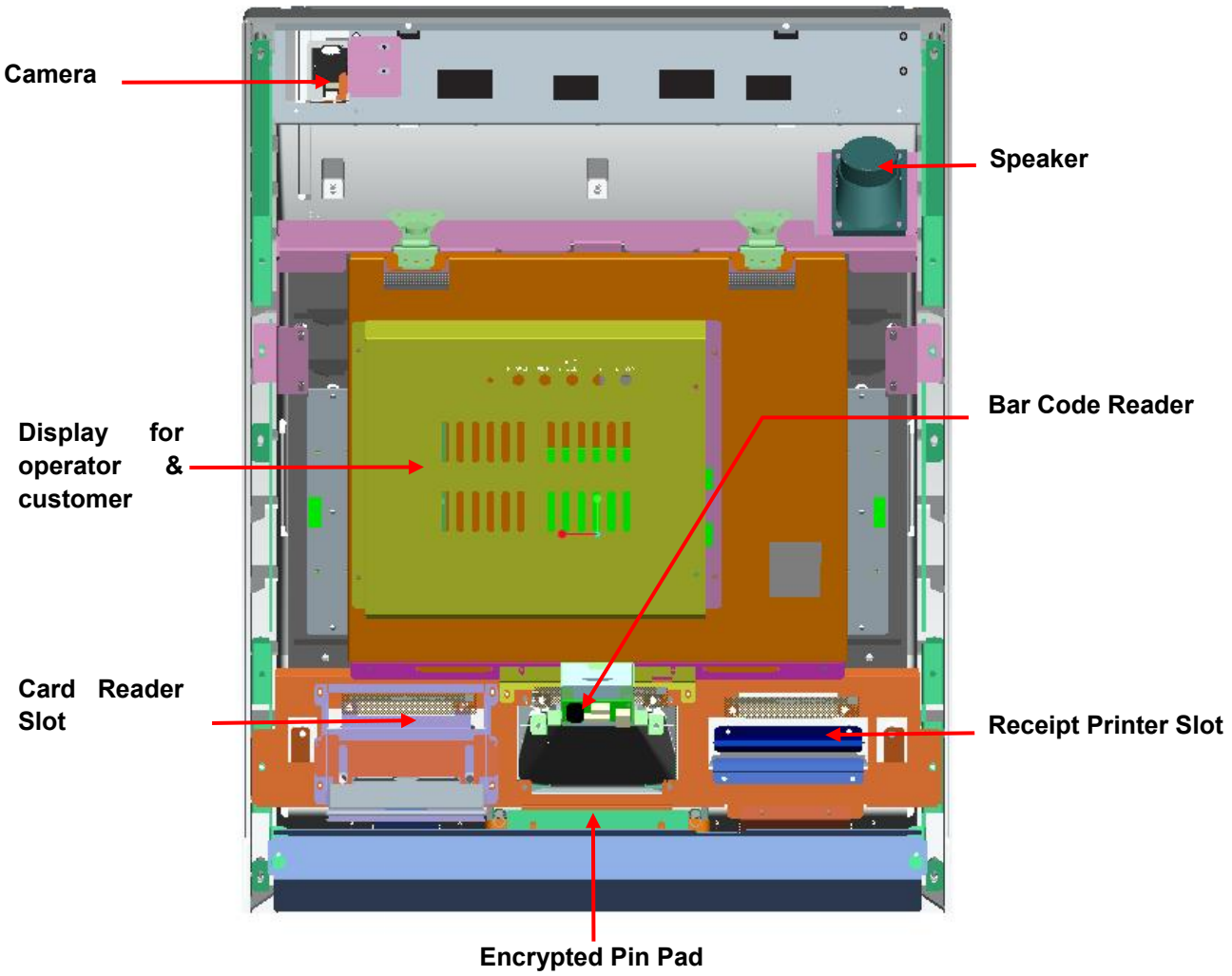



Fig 4.2 The back view of User Handling Unit

| UNIT | ITEM | SPECIFICATIONS |
|---|---|---|
| Display Unit | Display size and display method | 15.1 inch TFT LCD |
| | Resolution | 1024X 768 pixels (XGA) |
| | Supported colors | 16.2 millions colors |
| | Brightness adjustment method | Control by OSD board |
| Input Device Unit | Function Key or Touch Screen | Support |
| | Operation key | 16 Key |
| Additional function | Audio guidance | Sound (Option) |

Table 4.1 Specification of User Handling Panel Unit

## 4.2 Monitor

A monitor is composed of privacy display filter, protective glass, LCD, DC/DC converter, analog board, inverter and On Screen Display (OSD) board as shown in the figure below.

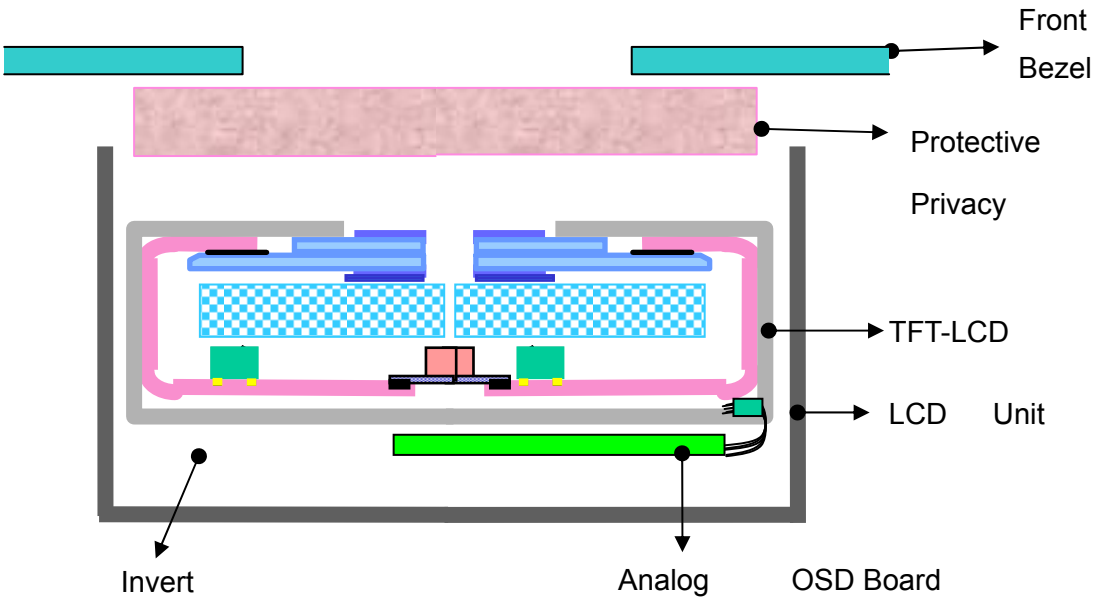



Fig 4.3 The schematic diagram of Liquid Crystal Display

### 4.2.1 TFT Color LCD

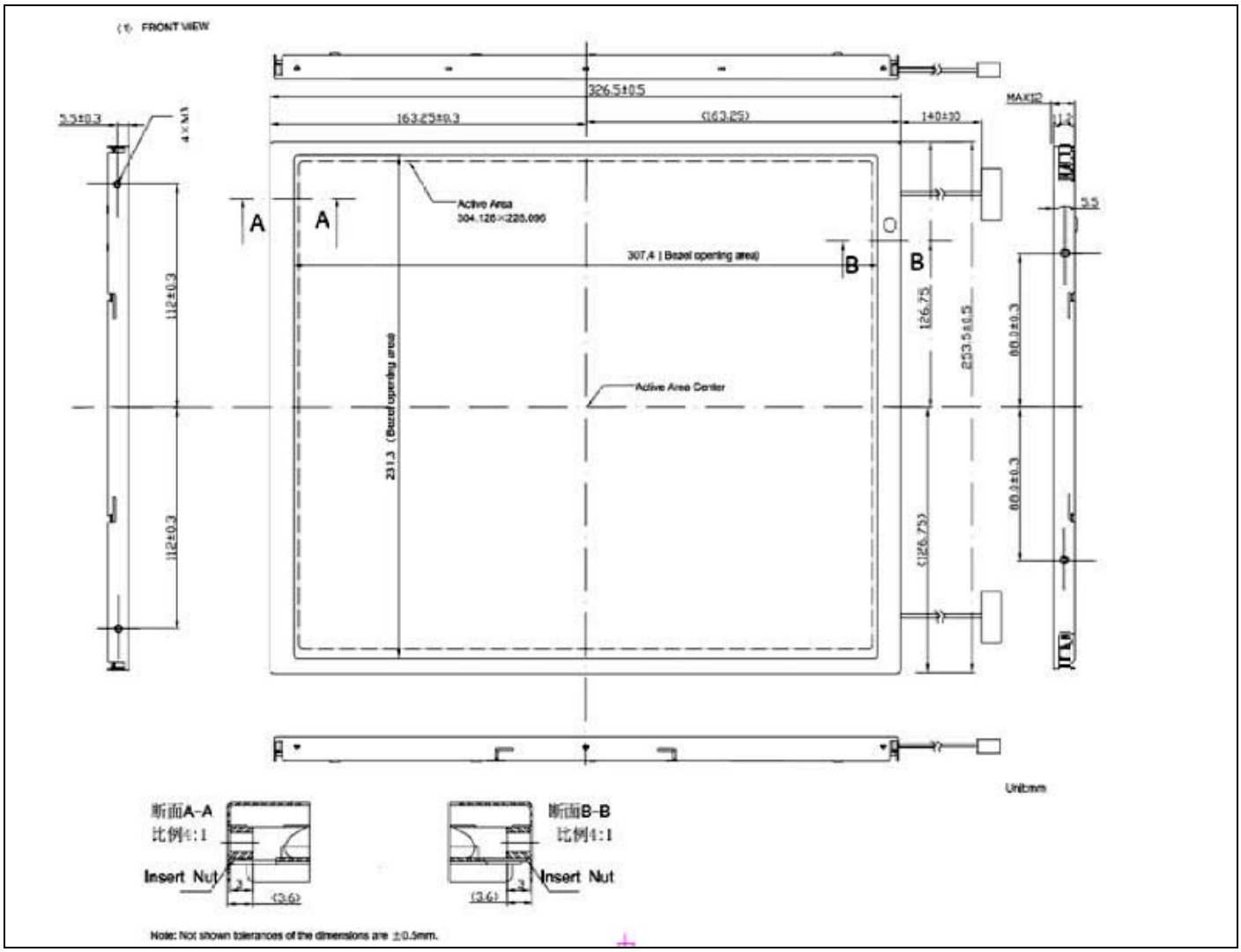
#### 4.2.1.1 Characteristics

The following items are neither defects nor failures.

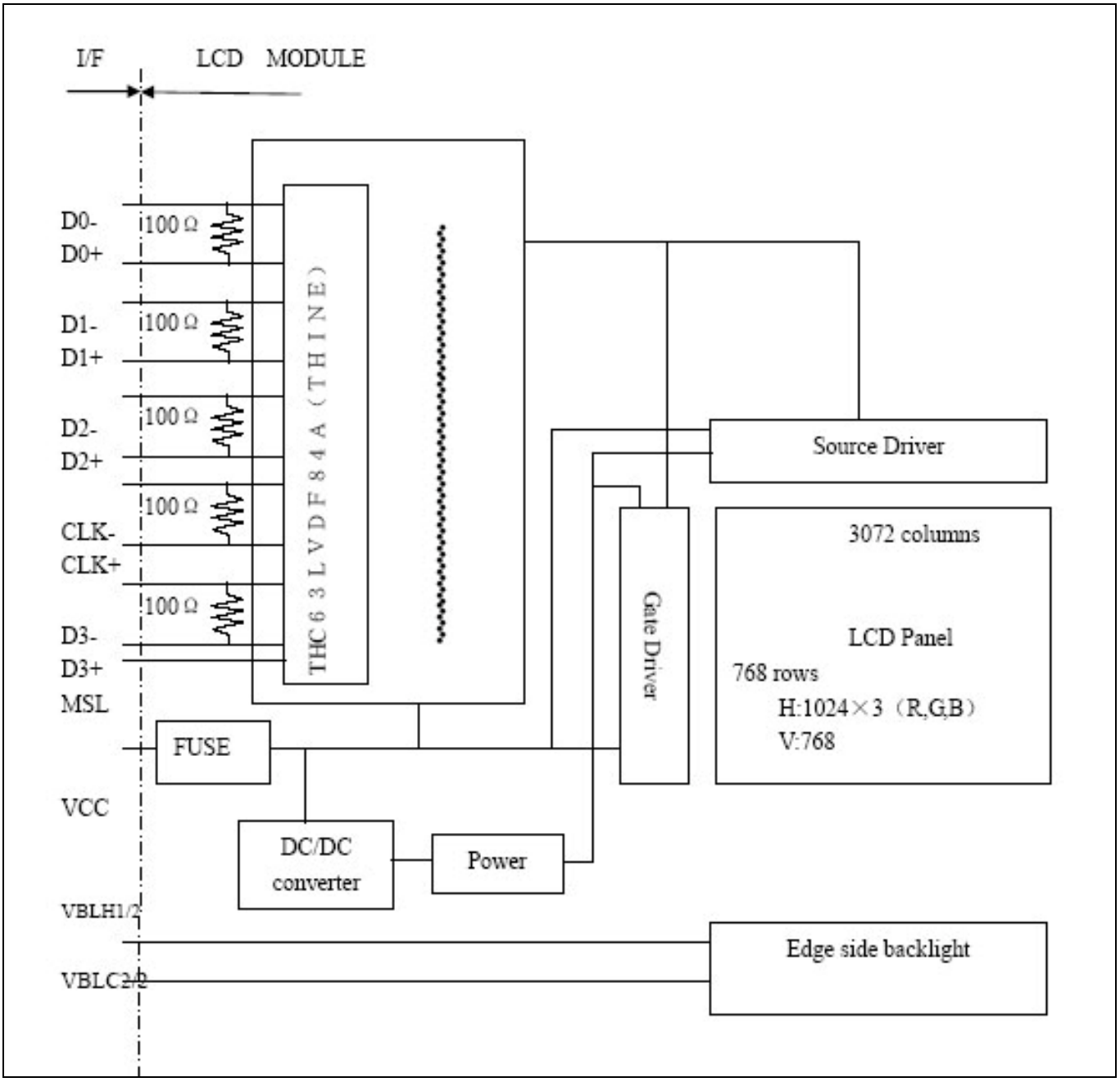
- Response time, luminance and color may be changed by ambient temperature.
- The LCD may be seemed luminance non-uniformity, flicker, vertical seam or small spot by display patterns.
- Optical characteristics (e.g. luminance, display uniformity, etc.) gradually is going to change depending on operating time, and especially low temperature, because the LCD has cold cathode fluorescent lamps.
- Do not display the fixed pattern for a long time because it may cause image sticking. Use a screen saver, if the fixed pattern is displayed on the screen.
- The display color may be changed by viewing angle because of the use of condenser sheet in the backlight.
- Optical characteristics may be changed by input signal timings.

- The interference noise of input signal frequency for this product and luminance control frequency of customer's backlight inverter may appear on a display. Set up luminance control frequency of backlight inverter so that the interference noise doses not appear.

#### 4.2.1.2 Outside Drawing of LCD: Front



### 4.2.1.3 LCD Block Diagram




**Note 1 :** Connection between GND, FG (Frame ground) and VBLC (Lamp low voltage terminal) in the product.

| | |
|---|---|
| GND-FG | Connected |
| GND-VBLC | Not connected |
| FG-VBLC | Not connected |

**Note 2 :** These grounds should be connected together in customer equipment.

### 4.2.1.4 General Specifications of LCD

| | | |
|---|---|---|
| **Display area** | | 304.128 (W) x 228.096 (H) mm (typ.) |
| **Diagonal size of display** | | 38.0 cm (15.0 inches) |
| **Drive system** | | a-Si TFT active matrix |
| **Display color** | | 16,777,216 colors (6bit+FRC) |
| **Pixel** | | 1,024 (H) x 768 (V) pixels |
| **Pixel arrangement** | | RGB (Red dot, Green dot, Blue dot) vertical stripe |
| **Dot pitch** | | 0.099 (W) x 0.297 (H) mm |
| **Pixel pitch** | | 0.297 (W) x 0.297 (H) mm |
| **Module size** | | 326.50 (W) x 253.5 (H) x 11.2 (D) mm (typ.) |
| **Weight** | | 1000 g (typ.) |
| **Contrast ratio** | | 450:1 (typ.) |
| **Viewing angle** | | ● Horizontal : 120° (typ.)<br>● Vertical : 100° (typ.) |
| **Designed viewing direction** | | ● Viewing angle with optimum grayscale : normal axis |
| **Color gamut** | | At LCD panel center<br>60% (typ.) [against NTSC color space] |
| **Response time** | | Ton (white 90% → black 10%) + Tpff (black 10 % → white 90 %)<br>16 ms (typ.) |
| **Luminance** | | At IBL = 7.5mArms/lamp<br>250cd/$m^2$ (typ.) |
| **Signal system** | | LVDS 1 port<br>[RGB : 8-bit, Dot clock (CLK), Data enable (DE)] |
| **Power supply voltage** | | LCD panel signal processing board : 3.3V |
| **Backlight** | | Edge light type : 2 cold cathode fluorescent lamps<br>- Replaceable part<br>● Lamp holder set : Type No. 150LHS21 |
| **Power consumption** | | At IBL=7.5mArms/lamp and checkered flag pattern<br>9.5W (typ.) |
| **Mechanical Specifications** | Module size | 326.5 ± 0.5(W) x 253.5 ± 0.5(H) x 11.2 ± 0.5 (D) |
| | Display area | 304.128 (W) x 228.096 (H) |
| | Weight | 1000 (typ.) |

#### 4.2.1.5 Disassembling the LCD assembly

1) Insert the key on rear door and turn it clockwise.
2) Turn power off
3) Open the side doors with key.
4) Remove ALL cables connected to Display carefully
5) Loosen two mechanical locks at both sides on Display supporting bracket, turning them counter clockwise slowly and then take LCD module out.
6) Assemble the LCD unit using the reverse order of disassembly.

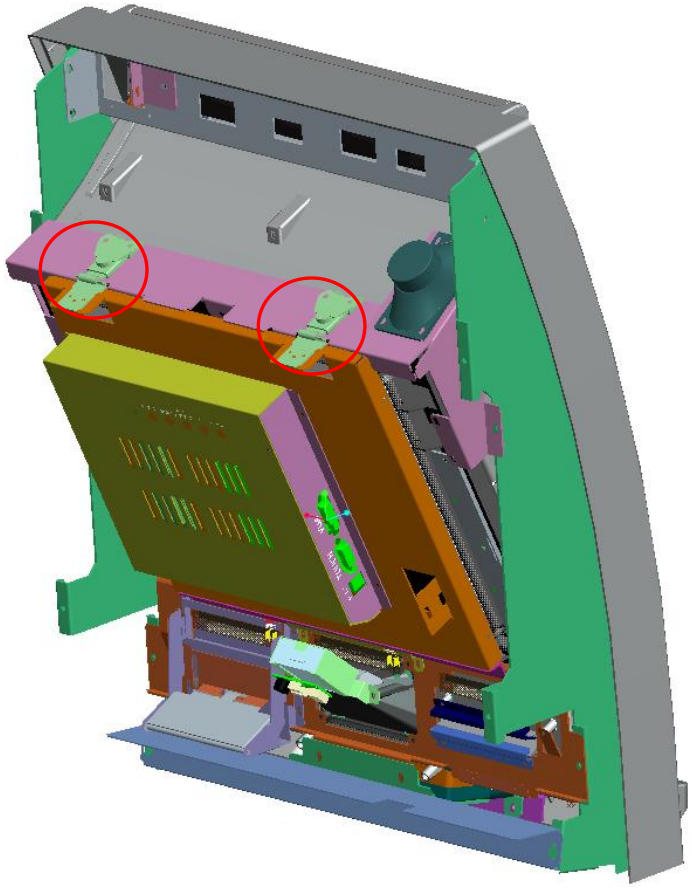


Fig 4.4 The disassembly procedure of LCD (#2)

### 4.2.2 General Precautions

1) Handling

- When the module is assembled, it should be attached to the system firmly using every mounting holes. Be careful not to twist and bend the modules.
- Refraining from strong mechanical shock and/or any force to the module. In addition to damage, this may cause improper operation or damage to the module and CCFT back-light
- Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur
- When this module is disassembled from the front panel and is tried to assemble again, you should check the condition of surface. If the surface of the polarizer is dirty by the foreign things, dusts, fingerprint, clean it using some absorbent cotton or soft cloth
- The desirable cleaners are water, IPA(Isopropyl Alcohol) or Hexane. Do not use Ketone type materials (ex.Acetone), Ethyl alcohol, Toluence, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
- If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap
- Protect the module from static, it may cause damage to the C-MOS Gage Array IC
- Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process
- Do not adjust the variable resistor which is located on the back side.
- Pins of I/F connector shall not be touched directly with bare hands.

2) Storage

- Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35℃ and relative humidity of less than 70%
- Do not store the TFT-LCD module in direct sunlight
- The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent l ight during the store

3) Operation

- Do not connect, disconnect the module in the “Power On” condition.
- Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufactures. Grounding and shielding methods may be important to minimize the interference.

4) Others

- Avoid condensation of water. It may result in improper operation or disconnection of electrode.
- If the module displays the same pattern continuously for a long period of time, it can be the situation when the image “stick” to the screen

## 4.2.3 Troubleshooting Procedure

### 4.2.3.1 The screen is blank.

1) “No signal” message is displayed on the LCD.

-> Check whether the DVI cable is properly connected to OPL Assy or VGA card.

-> Check if the main board is in hang-up state or powered off.

-> Check if the display setting of the VGA card is active (using SPL.)

* If the system was booted with the video cable (DVI or RGB) being disconnected, reconnecting the cable may not solve the problem.

Tip) CTRL+ALT+F1: Activates DVI display.

### 4.2.3.2 The LCD is black.

1) Backlight of the LCD panel is off.

-> Check the power cable connection status of OPL assembly. (Check +24V input.)

-> Check the LED color of the OSD board.

- LED OFF: The AD board is in off state. Press OSD Power On/Off button.
- Green ON: The AD board is in normal state.

*Check or replace the inverter cable or inverter board.

-> If the trouble persists, replace the AD board.

-> If the trouble persists even after the AD board is replaced, replace the LCD assembly.

2) Backlight of the LCD panel is on.

-> Connect/Disconnect the power line of OPL assembly.

-> If “Nautilus HYOSUNG” logo is not displayed on the OPL screen, replace the AD board.

### 4.2.3.3 The LCD is displayed white.

-> Check the installation status of the LVDS cable inside the assembly.

-> If the trouble persists even when the installation status is normal, replace the cable.

-> If the trouble persists even after the cable is replaced, replace the AD board.

-> IF the trouble persists even after the AD board is replaced, replace OPL assy.

#### 4.2.3.4 When the screen is in red or other colors (when the color display is normal)

-> Check the connection status of the video cable. (Connect again.)

-> Check whether the video cable has not been damaged using spare video cable.

-> Check the connection status of the LVDS cable. (Connect again.)

-> If the trouble persists, replace the LVDS cable.

-> If the trouble persists even after LVDS cable is replaced, replace the AD board.

#### 4.2.3.5 The screen does not provide visible display.

-> Replace the LVDS cable.

-> If the trouble persists, replace the AD board.

● **Inverter**



● **AD Board**

AD board is on the rear of LCD. This board is disassembled from LCD by removing all screws and connectors.

● **Connectors on AD Board**

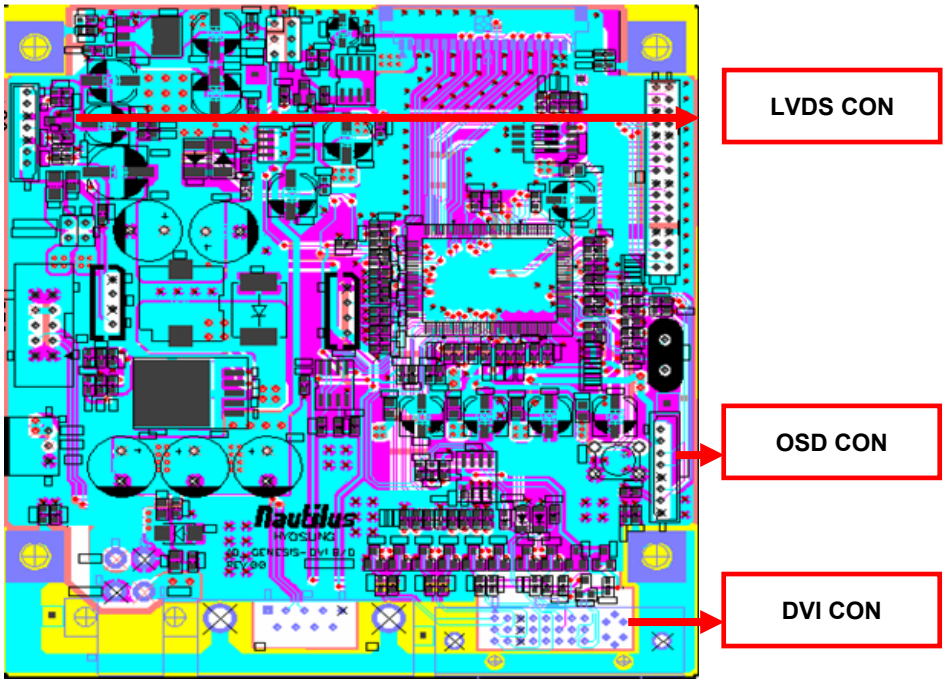



Fig 4.5 Connectors on AD Board

# 4.3 Panel Control Board

## 4.3.1 Specification

### 4.3.1.1 Basic Specifications

| ITEM | SPECIFICATIONS | REMARKS |
|---|---|---|
| CPU | AT89S52 (8051 Compatible) | - |
| Serial Communication | RS-232 1 Port | - |
| Function Key Input | 4 X 2 Support | - |
| Flicker supported | 8EA (MCU,EDU,CDU,SPR, Reserved) | - |
| Sensor supported | 8EA (Door Sensor(Safe door and Front door)) | - |
| Power Interface | System Power Sequence Support | - |

### 4.3.1.2 Communication Interface Specification

- Uses the RS-232 at the speed of 9600bps.

### 4.3.1.3 Power Interface Specification

- 24V single output is the basic power supply. Pin 1&2 has 24V, while Pin 3 &4 has GND. The power inside the Control Board is 24V and it uses 12V, 5V, and 3.3V. The voltage for Card Reader/LCD is 12V, while 5V is the power supply for PIN PAD.

### 4.3.2 H/W Block Diagram

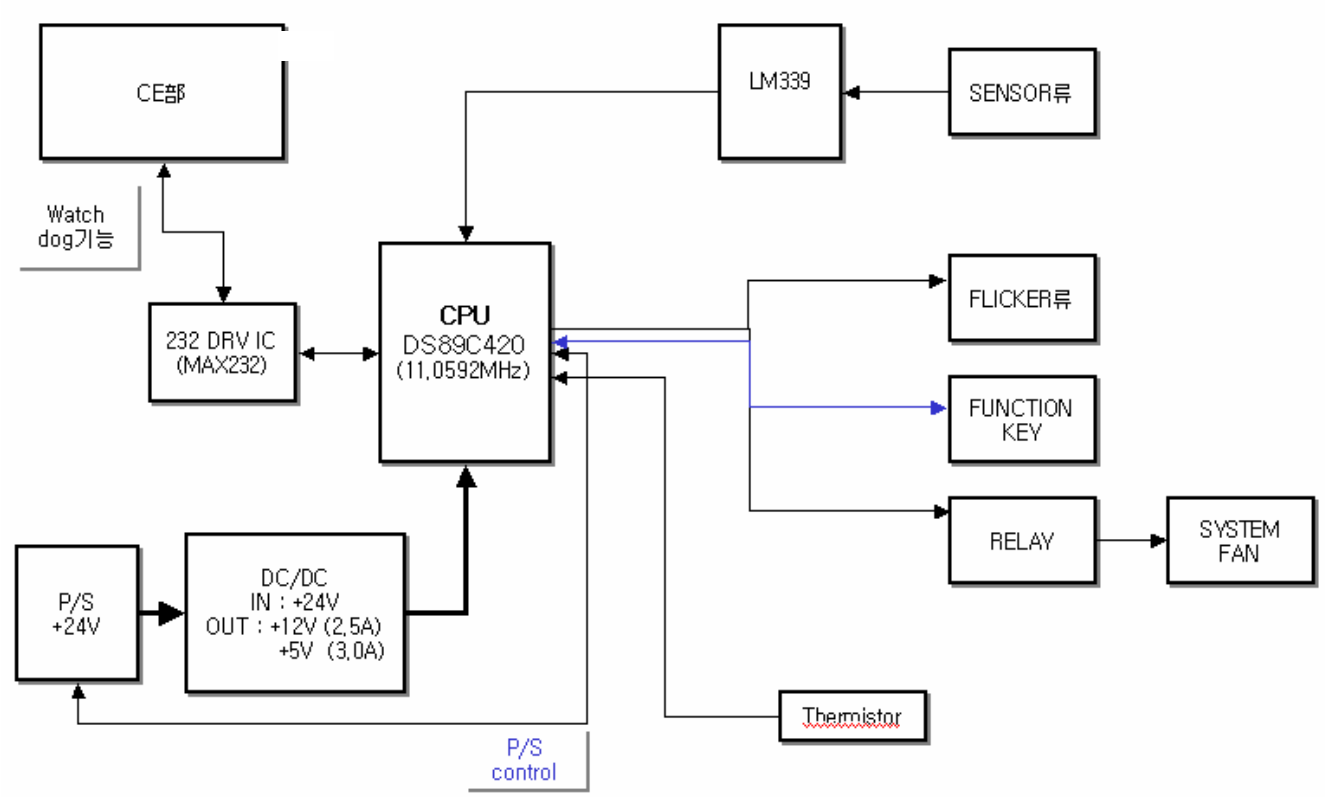



Fig 4.6 H/W Block Diagram

### 4.3.3 PCB Silk Diagram

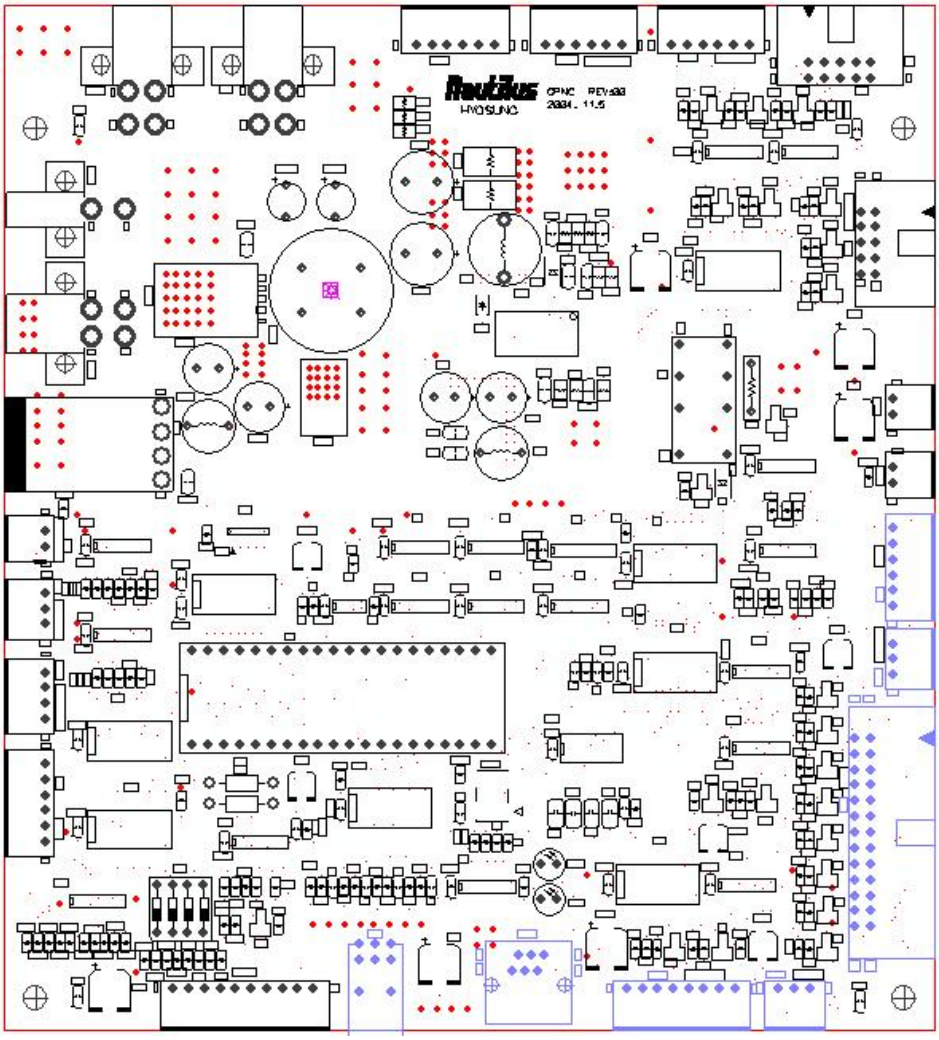


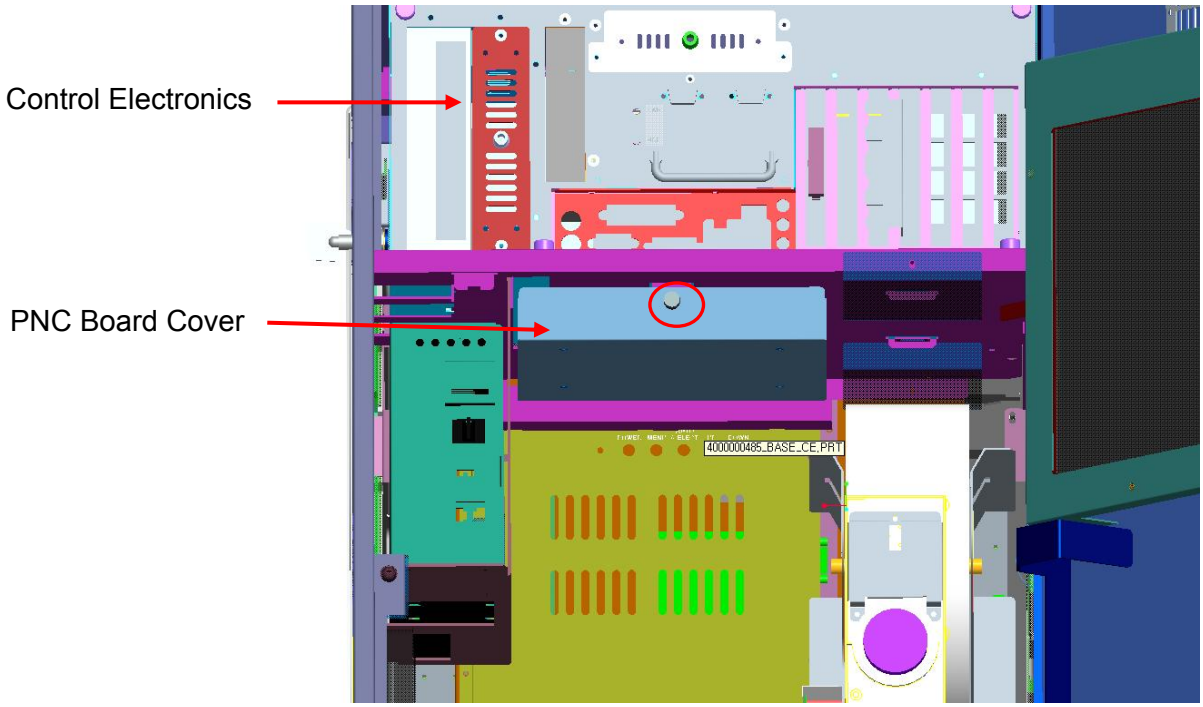
Fig 4.7 PCB Silk Diagram

### 4.3.4 Connector Interface

1) CN1(6Pin, P/N : 33300906) : Lift Function Key
2) CN2(6Pin, P/N : 33300906) : Right Function Key
3) CN3(26Pin, P/N : 33301326) : Flicker, CDU, SHU, DOOR SENSOR INPUT
4) CN4(4Pin, P/N : 33311904) : +12V, +5V Power OUTPUT
5) CN5(4Pin, P/N : 33316604) : +24V Power INPUT
6) CN6, CN7(10Pin, P/N : 33301310) : Touch Screen
7) CN8(3Pin, P/N : 33300903) : Reserved Power
8) CN9(2Pin, P/N : 33300902) : MOD S/W
9) CN10(6Pin P/N : 33408506) : PNC ↔ CE I/F
10) CN11(8Pin, P/N : 33300908) : Power Supply Control
11) CN12(3Pin, P/N : 33300903) : Power Switch
12) CN13(3Pin, P/N : 33300903) : NVRAM clear
13) CN14(4Pin, P/N : 33300904) : ADA Detect Sense
14) CN15(6Pin P/N : 33300906) : LED Indicator(IN SERVICE, SUPERVISOR, ERROR,Reserved)
15) CN16(2Pin, P/N : 33300902) : ON USE LED
16) CN17(2Pin, 3330000004 ) : +24V FAN Control
17) CN18(6Pin, P/N : 33300906) : LED Indicator (COMMUNICATION+2 Reserved)
18) CN19(2Pin, P/N : 33300902) : Reset Switch
19) CN20(4Pin, P/N : 33311904) : +12V, +5V Power OUTPUT
20) CN21(4Pin, P/N : 33311904) : +24V, +5V Power OUTPU
21) CN22(6Pin, P/N : 33300906) : RESERVED RELAY
22) CN25(10Pin, P/N : 33301310) : RESERVED_SENS_IN

### 4.3.5 Disassembly and assembly procedure of PNC board

1) Insert the key on the rear door and turn it clockwise.
2) Open the rear door by pulling it outward and turn power off.
3) Open the PNC board cover by pulling out the button as marked in the below picture.
4) Remove all cables connected to the board and screws to disassemble the PNC board.




5) Use the reverse order of the disassembly to assemble the unit.

## 4.4 Encrypted PIN Pad

EPP(Encrypted PIN Pad) is a device that encrypts sensitive data such as customers' card information and passwords, which requires the highest level of security, and transmits it to the Host. Therefore, if EPP problem occurs in the field, verify the problem and replace the entire unit. You cannot disassemble the internal components or replace them individually.

The following figure is the back of the EPP. The functions and roles of each part are summarized as below.

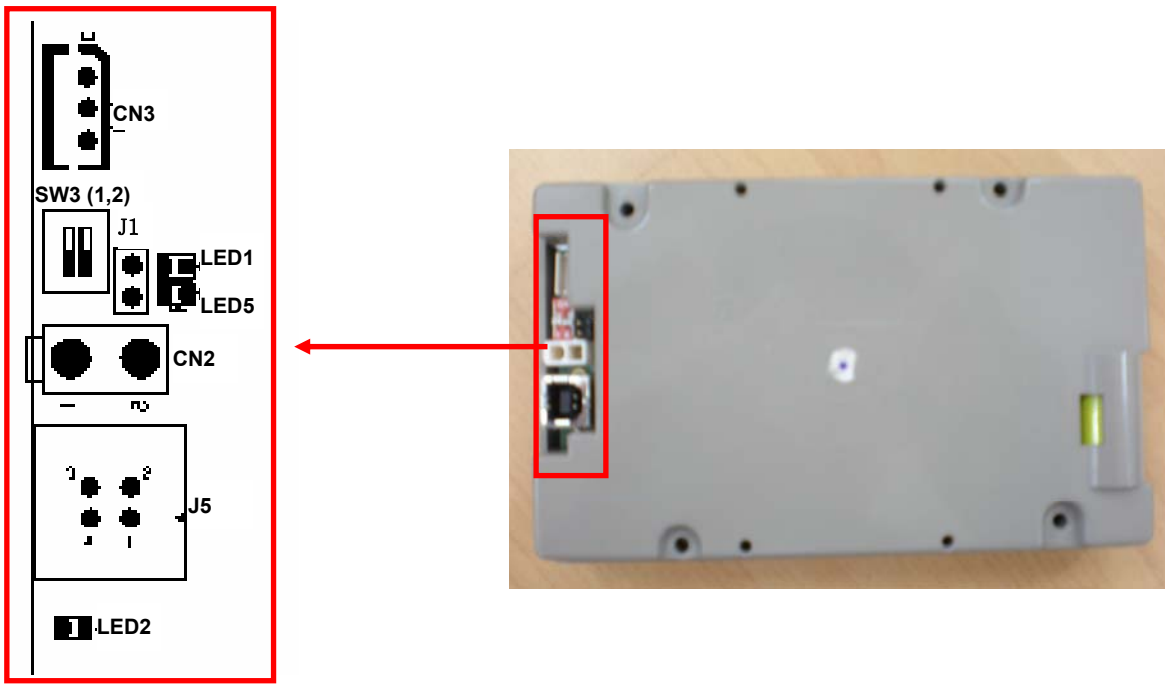



Fig 4.8 Back of EPP

| NO | LABELING | DEFAULT SETTING | DESCRIPTION | REMARK |
|---|---|---|---|---|
| 1 | CN2 | - | Power connector(5V) | |
| 2 | CN3 | - | Firmware downloading connector | Due to security issues, no repair is possible in the field |
| 3 | SW3(1,2) | OFF | NV-RAM is clear when No.1 switch is turned ON | |
| | | OFF | Fuse is open when No.2 switch in turned ON and at the same time J1 is short | |
| 4 | J1 | Open | Used for downloading the Firmware or turning off the fuse forsecurity reason. | |
| 5 | J5 | - | USB communication connector | |

### 4.4.1 Common Occurred Problem List

① In case the EPP cover is detached-- to whatever extent-- due to a mistake made by an operator or the maintenance personnel
② In case there is a damage caused by any external shock or static electricity
③ In case the EPP is not connected with an earth cable, which makes it vulnerable to static electricity
④ In case the battery is discharged.

### 4.4.2 LED Operation Check

There are 3 LEDs at the back of the EPP. With the status of these 3 LEDs, the EPP operation condition can be easily checked..

| NO | LED | DESCRIPTION | REMARK |
|---|---|---|---|
| 1 | LED1 (Power LED) | Whether the power supply is in “normal” status<br>(If it is normal, red light will be turned on LED) | |
| 2 | LED2 (Status LED) | Whether the EPP is in “normal” operation<br>(If it is normal, LED will blink) | |
| 3 | LED5 (NV-RAM LED) | Whether the NV-RAM is properly cleared<br>(If it is normal, red light will turned on LED) | |

### 4.4.3 Troubleshooting

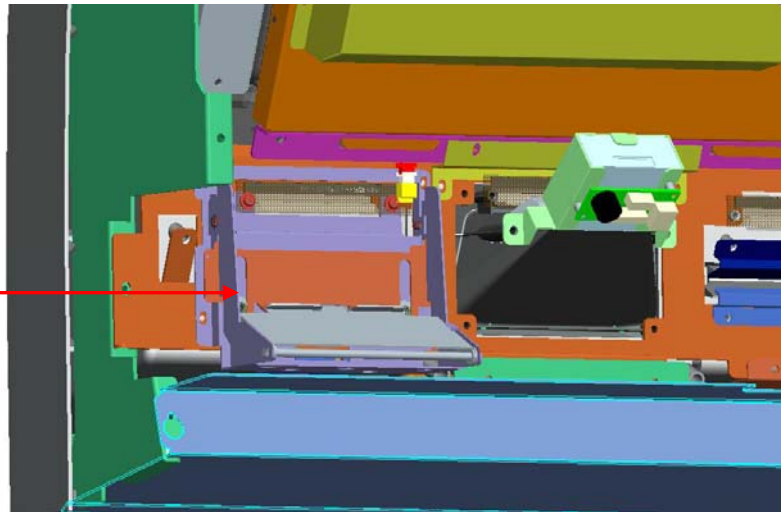
- Since the problem in this unit involves a security issue, you should replace the entire unit when encountering a problem.
- If a problem is confirmed, turn off the power, remove the power cable and bracket, and then replace the unit with a new one. For the assembly of the unit, follow the reverse order.

① If LED1 is off, check the cable connection to see if the power supply is okay.
② If LED1 is on and LED2 is off, it means EPP is in abnormal operation. Therefore, replace the EPP.

### 4.4.4 Disassembling the EPP module

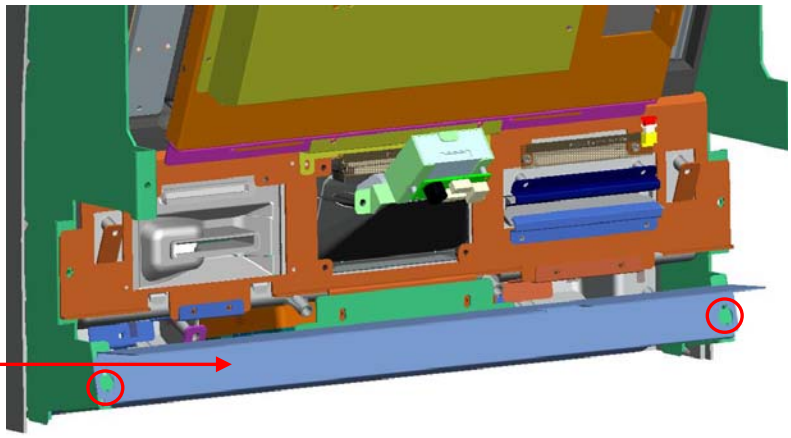
1) Insert the key on rear door and turn it clockwise.
2) Turn power off
3) Open the doors of the both sides with key.
4) First disassemble the PL shutter as pictured below.

Disassemble this PL shutter.



5) Then disassemble the bracket by removing 2 screws as pictured below. .

Disassemble this bracket by removing 2 screws on the side.



6) Disassemble EPP by removing 4 screws as pictured below.

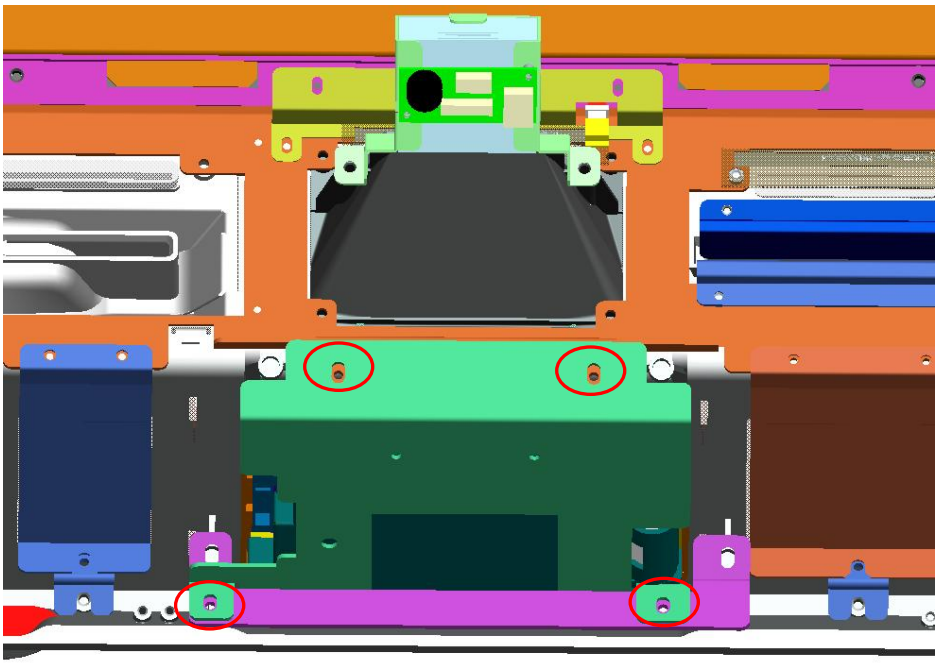


Fig 4.9 The disassembly procedure of EPP module

7) Do NOT attempt to DISASSEMBLE further for security. Doing so may cause data loss.

8) Please use the reverse order to assemble it again.

## 4.5 Analogue Digital Board

### 4.5.1 Basic features and functions

- Processor : High Performance X86 MCU
- Clock Input : 14.318MHz
- OSD (On Screen Display) Control (Using CN301 Connector)
- LCD Panel ON/OFF (Using OSD Menu and Door Sensor)
- LCD Panel Brightness Control (Using OSD Menu)
- Firmware Download (Using CN302)
- LVDS/TTL Output (Using J7 Connector)
- Analog RGB(D-sub 15pin Con) Input (Using CN202)
- Digital Video Interface(DVI) Input (Using CN202)
- Touch Panel Bypass Connecting (Using J13,J14 Connector)
- LCD On/OFF function with the change of Door sensor (Using J8 Connector)

### 4.5.2 Block diagram

**Figure 2: gm5766 System Design Example – LVDS Transmitter**

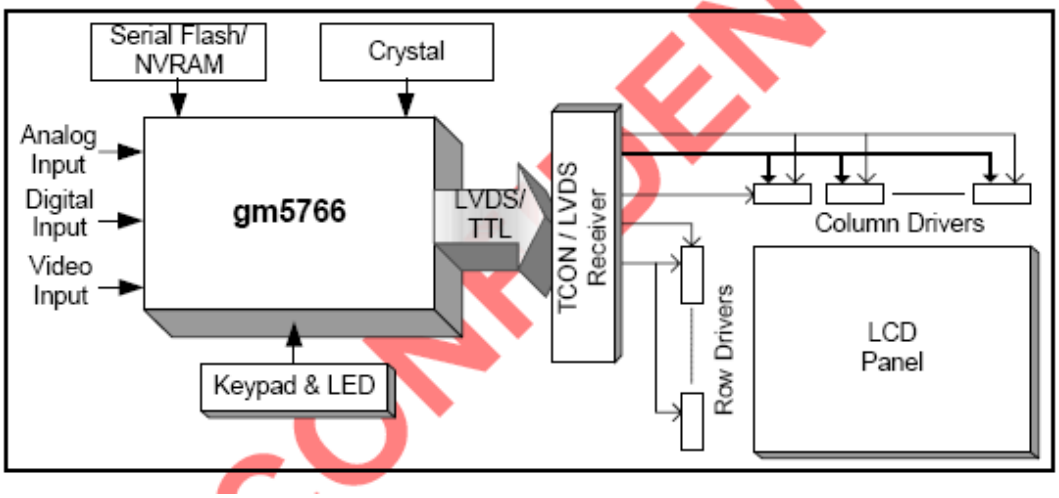



Fig 4.10 The Block Diagram of AD board

CONFIDENTIAL

## 4.5.3 Interface Connector

### 4.5.3.1 Interface Connector Configuration

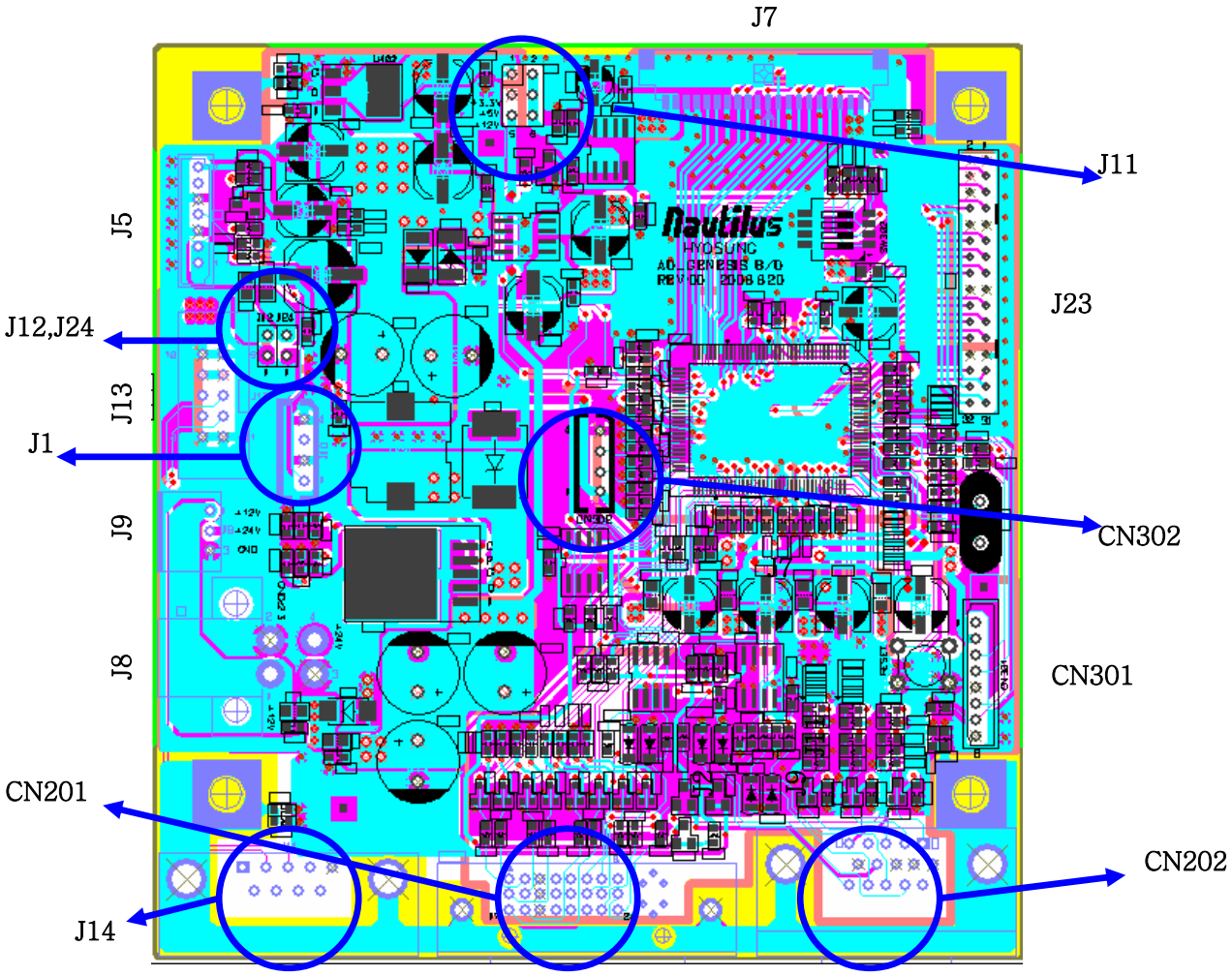



Fig 4.11 The Silk Diagram of AD board

1) CN301(53014_8Pin, P/N : 33309308) : OSD B/D

| PIN | Description | PIN | Description |
|---|---|---|---|
| 1 | NC | 5 | GND |
| 2 | VCC(+5V) | 6 | KEY1 |
| 3 | LED_GREEN | 7 | NC |
| 4 | LED_RED | 8 | NC |

2) CN302(5267_4Pin, P/N : 33316303) : For F/W DOWNLOAD

| PIN | Description | PIN | Description |
|---|---|---|---|
| 1 | VCC | 3 | TXD |
| 2 | RXD | 4 | GND |

3) J5(53014_7Pin, P/N : 33309307) : INVERTER

| PIN | Description | PIN | Description |
|---|---|---|---|
| 1 | VCC (+12V or +24V) | 5 | GND |
| 2 | VCC (+12V or +24V) | 6 | NC |
| 3 | GND | 7 | BRIGHT_ADJ |
| 4 | CONTROL(ON/OFF) | - | - |

4) CN202(D_SUB 15Pin, P/N : 33403301) : Input Analog R,G,B

| PIN | Description | PIN | Description |
|---|---|---|---|
| 1 | RED | 9 | NC |
| 2 | GREEN | 10 | GND |
| 3 | BLUE | 11 | GND |
| 4 | GND | 12 | ASDA |
| 5 | VGA_DET | 13 | HSYNC_A |
| 6 | GND | 14 | VSYNC_A |
| 7 | GND | 15 | ASCL |
| 8 | GND | - | - |

5) J8(5569_4Pin, P/N : 33311904) : Input +12V Power

| PIN | Description | PIN | Description |
|---|---|---|---|
| 1 | +12V | 3 | GND |
| 2 | GND | 4 | **+24V(Option)** |

6) J7(LVDS_20Pin, P/N : 3345000001) : Output LVDS

| PIN | Description | PIN | Description |
|---|---|---|---|
| 1 | NC(SKIP) | 11 | GND |
| 2 | GND | 12 | TXOP1 |
| 3 | TXOP3 | 13 | TXOM1 |
| 4 | TXOM3 | 14 | GND |
| 5 | GND | 15 | TXOP0 |
| 6 | TXCLKP1 | 16 | TXOM0 |
| 7 | TXCLKM2 | 17 | GND |
| 8 | GND | 18 | GND |
| 9 | TXOP2 | 19 | PANEL_PWR |
| 10 | TXOM2 | 20 | PANEL_PWR |

7) J11(JUMPER_6Pin, P/N : 33313601) : LCD Panel Power Selecting

| PIN | JUMPER SETTING |
|---|---|
| 1,2 | **+ 3.3V (DEFAULT SETTING)** |
| 3,4 | + 5V |
| 5,6 | + 12V |

8) J13(HIROSE_10Pin, P/N : 33301410) : Touch Screen(Touch Panel to AD B/D)

| PIN | Description | PIN | Description |
|---|---|---|---|
| 1 | GND | 6 | GND |
| 2 | RXD | 7 | TXD |
| 3 | NC | 8 | NC |
| 4 | +5V | 9 | +5V |
| 5 | GND | 10 | GND |

9) J14(D-SUB 9Pin, P/N : 33401801) : Touch Screen(AD B/D to Host)

| PIN | Description | PIN | Description |
|---|---|---|---|
| 2 | RXD | 3 | TXD |
| 5 | GND | | |

10) J9(5268_Molex_3P, P/N : 33300903) : +12V Power Input (For W-TTW)

| PIN | Description | PIN | Description |
|---|---|---|---|
| 1 | +12V | 2 | +24V |
| 3 | GND | - | - |

11) J11(JUMPER_4Pin, P/N : 33313601) : LCD Panel Power Selecting

| PIN | JUMPER SETTING |
|---|---|
| J12 | **+ 12V (DEFAULT SETTING)** |
| J24 | + 24V(Inverter for 24V) |

12) J8(5267_4Pin, P/N : 33316303) : Input Door Sensor

| PIN | Description | PIN | Description |
|---|---|---|---|
| 1 | BKLT_EN | 3 | NC |
| 2 | GND | 4 | GND |

13) CN201(DVI-I CONNECTOR) : Input DVI(DIGITAL VIDEO INTERFACE)

| PIN | Description | PIN | Description |
|---|---|---|---|
| 1 | RX2- | 18 | RX0+ |
| 2 | RX2+ | 19 | GND |
| 3 | GND | 20 | NC |
| 4 | NC | 21 | NC |
| 5 | NC | 22 | NC |
| 6 | DDC_SCL_DVI | 23 | - |
| 7 | DDC_SDA_DVI | 24 | - |
| 8 | NC | 25 | - |

| | | | |
|---|---|---|---|
| 9 | RX1- | 26 | - |
| 10 | RX1+ | 27 | - |
| 11 | GND | 28 | - |
| 12 | NC | 29 | - |
| 13 | NC | 30 | - |
| 14 | DVI_5V | 31 | - |
| 15 | NC | 32 | - |
| 16 | DVI_5V | 33 | FG |
| 17 | RX0- | 34 | FG |

14) J23(YDW200-32P, P/N : 33307532) : TTL Input

| PIN | Description | PIN | Description |
|---|---|---|---|
| 1 | PANEL_PWR | 17 | GND |
| 2 | PANEL_PWR | 18 | GND |
| 3 | DEN | 19 | GRN1 |
| 4 | PANEL_PWR | 20 | GRN0 |
| 5 | DCLK | 21 | GRN3 |
| 6 | GND | 22 | GRN2 |
| 7 | DVS | 23 | GRN5 |
| 8 | DHS | 24 | GRN4 |
| 9 | GND | 25 | GND |
| 10 | GND | 26 | GND |
| 11 | BLUE1 | 27 | RED1 |
| 12 | BLUE0 | 28 | RED0 |
| 13 | BLUE3 | 29 | RED3 |
| 14 | BLUE2 | 30 | RED2 |
| 15 | BLUE5 | 31 | RED5 |
| 16 | BLUE4 | 32 | RED4 |

## 4.6 Inverter Board

### Electrical Characteristics

Analog dimming

| No. | Items (Unit) | Sign. | Condition | | Min. | Typ. | Max. |
|---|---|---|---|---|---|---|---|
| 1 | Input Voltage (Vdc) | Vin | | | 11.5 | 12 | 12.5 |
| 2 | Input Current (A) | Iin | Vin=12V | CTRL=5V | 0.3 | 0.45 | 0.6 |
| | | | | CTRL=0V | 0.75 | 0.92 | 1.0 |
| 3 | Output Current 1,2(mA) | Iout1,2 | Vin=12V | CTRL=5V | 1.7 | 3.0 | 4.3 |
| | | | | CTRL=0V | 7.0 | 8.0 | 8.9 |
| 4 | Output Current 3,4(mA) | Iout3,4 | Vin=12V | CTRL=5V | 0 | 0 | 0 |
| | | | | CTRL=0V | 0 | 0 | 0 |
| 5 | Lamp Frequency (kHz) | f | Vin=12V | CTRL=0V | 40 | 50 | 60 |
| 6 | ON/OFF Control | ON | Vin=12V, ON/OFF=5V | | Normal Operation | | |
| | | OFF | Vin=12V, ON/OFF=0V | | Shunt-down (Lamp off) | | |
| 7 | Dim Adjust (Lamp Current Control) | CTRL | CTRL=0V,Max Current | | 0 ~ 5 Volt. | | |
| | | | CTRL=5V,Min Current | | | | |
| 8 | Kick-Off Voltage(Vrms) | Vk-off | Kick-Off | | More than 1300 | | |
| 9 | | | | | | | |

## Functional Pin Description

**Input Connector CN1 : 12505WR-10A00**

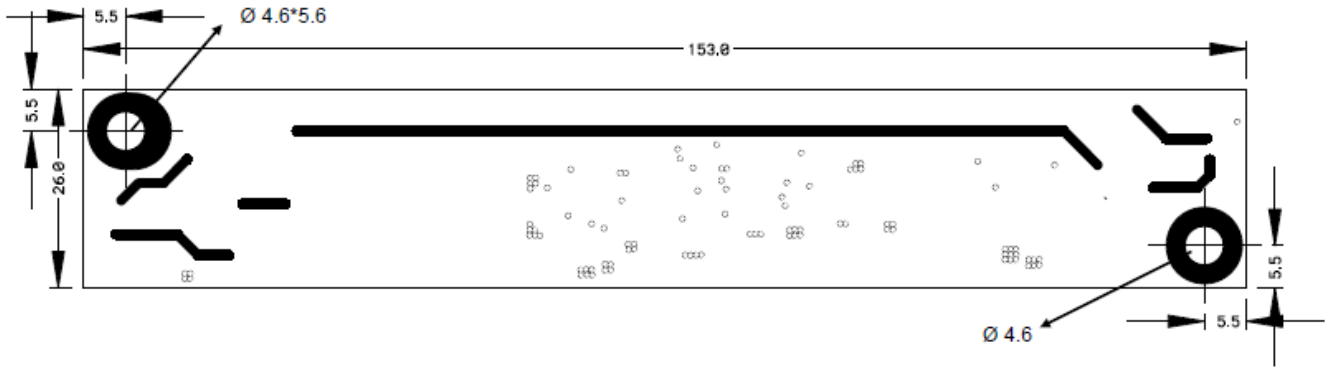
| Pin No. | Symbol | Description |
|---|---|---|
| 1 | CTRL | Dim Adjust, Apply 0V ~ 5Vdc to Control Lamp Current 0V : 8.0mA, 5V : 3.0mA (Each Lamp) |
| 3,4,7,8 | GND | GND |
| 5 | ON / OFF | Power System Return ( 5V:ON, 0V:OFF ) |
| 9,10 | Vin | Input Voltage : 12V ± 0.5V |

**Output Connector CN2,CN3 : 20015WR-05A00**

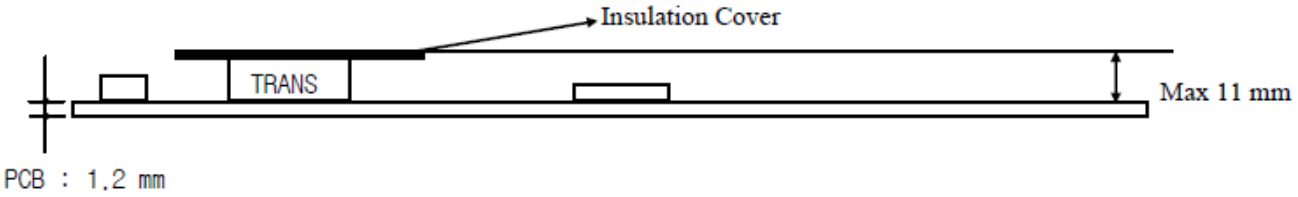
| Pin No. | Symbol | Description |
|---|---|---|
| 1 | Lamp H1 | High Voltage Connection to high side of Lamp. |
| 2 | Lamp L1 | Low Voltage Connection to low side of Lamp. |

## Mechanical Drawings

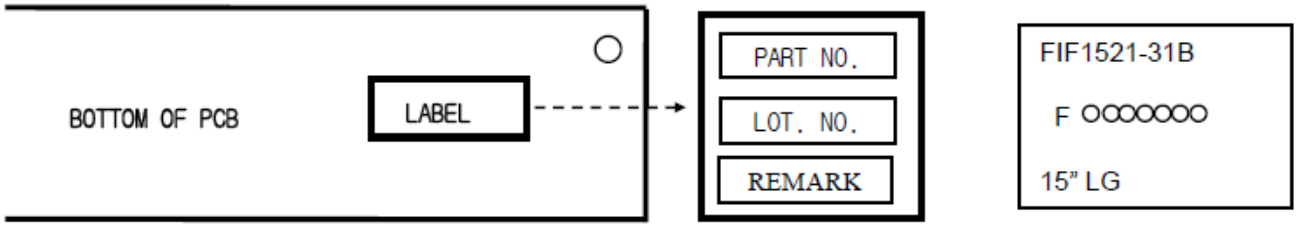
### P.W.B




### Component Max Height




### Marking






# 4.7 On Screen Display (OSD) Board

## 4.7.1 Key Specifications

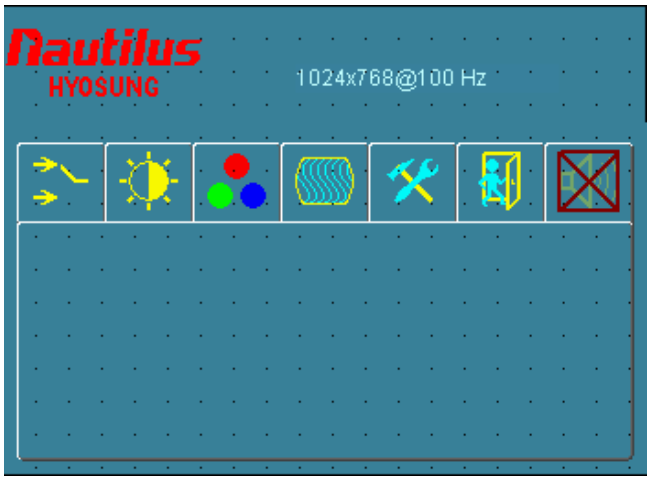
| ORDER | SW NO. | FUNCTION | DESCRIPTION | REMARKS |
|---|---|---|---|---|
| 1 | SW 1 | Power | Power On/Off. | - |
| 2 | SW 2 | Menu | Monitor Configuration | - |
| 3 | SW 3 | Selection | Configuration Selection | - |
| 4 | SW 4 | UP | Up setting | - |
| 5 | SW 5 | DOWN | Down setting | - |

## 4.7.2 LED Specifications

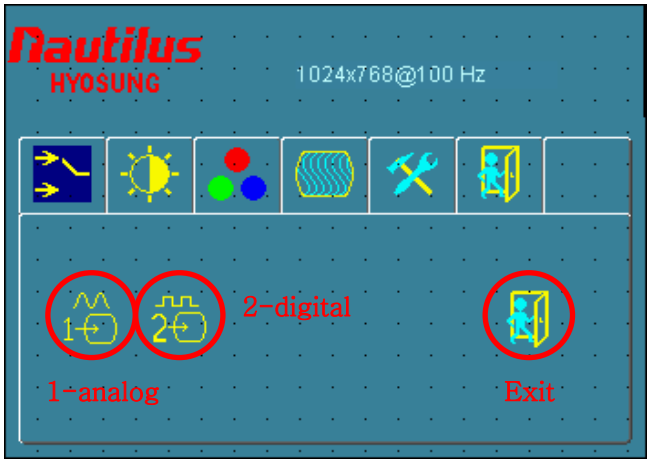
| SEQ | BLINKING COLOR | REMARKS |
|---|---|---|
| 1 | Red | Set by the main |
| 2 | Green | |

### 4.7.3 OSD MEMU

1) Main Menu

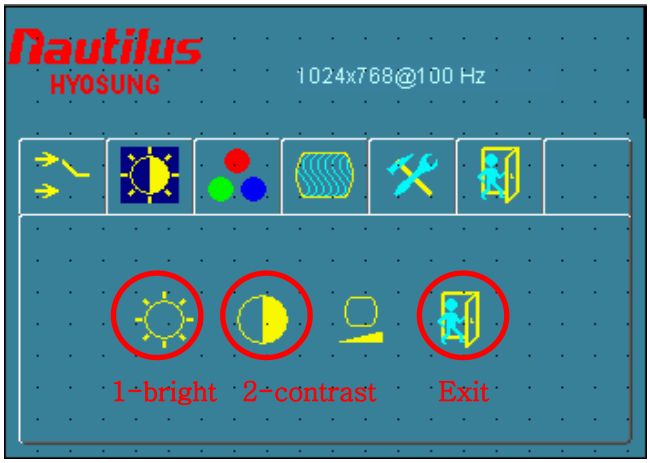



2) Mode Change



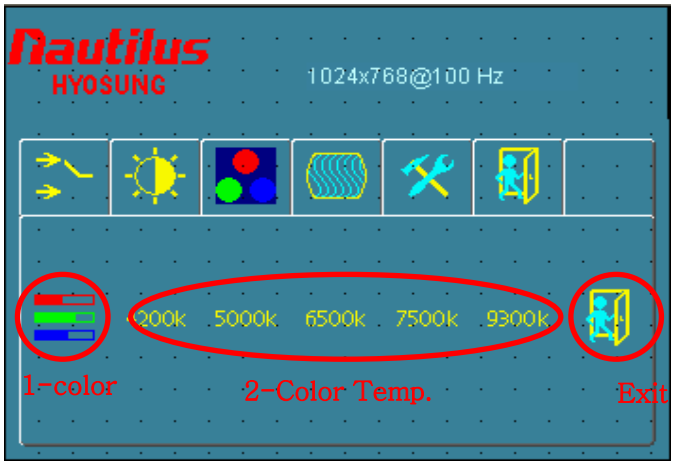

- Analog : Analog Input is applied
- Digital : Digital Input is applied

3) Bright Change



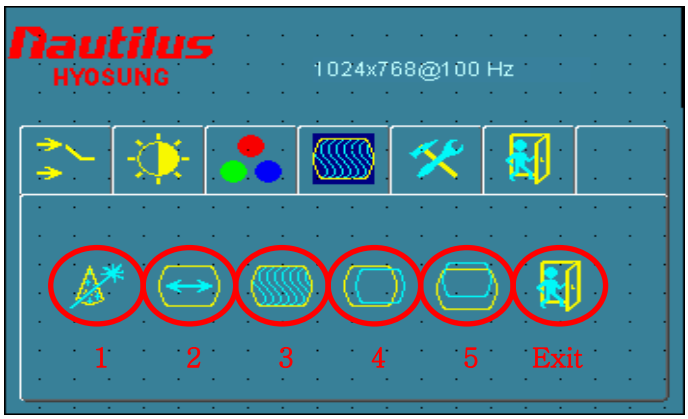

- 1 Bright : Bright adjustment
- 2 Contrast : Contrast adjustment

4) Color Change



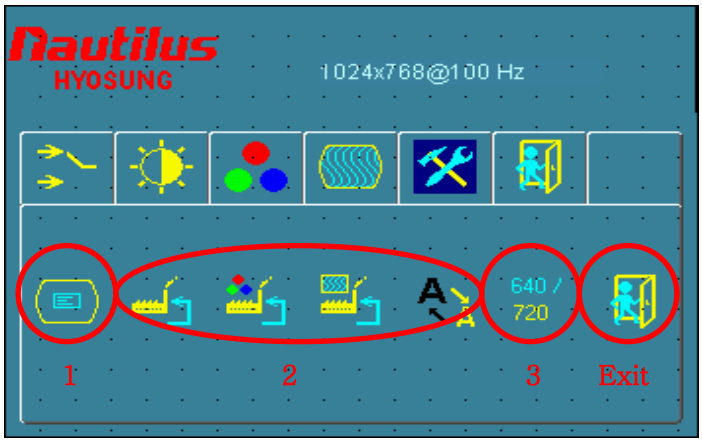

- 1 Color : Color adjustment
- 2 Color Temp : Color temperature adjustment

5) Position Change




- 1 Auto Position : Automatic position change
- 2 Clock : Clock change
- 3 Phase : Phase change
- 4 Horizontal position change
- 5 Vertical position change

6) Tool




- 1 OSD Setting : OSD setup change
- 2 Initialization Setting
- 3 Resolution : Resolution change

## 4.8 Bar Code Reader (Option)

The Bar Code Reader used in MoniMax 5600T is a compact single-line, laser scan engine with a patented automatic trigger. It is small, lightweight and had low power requirements.
This Bar Code Reader offers bar code scanning that's easy to configure and integrate. This powerful scan engine incorporates a host of features, providing flexibility for users in a variety of applications.
This Bar Code Reader has built-in decoding, which can be easily updated in the field to keep the scanner current.
Besides the powerful software, the engine is mechanically robust as well. The unit is entirely enclosed to prevent contamination from the environment. The modular design can also be incorporated into a number of different mounting configurations.

### 4.8.1 Features

1. Automatic Scanning Operation : Simply present a bar code and the unit scans in a single pass.
2. Long Range/Short Range Activation : Program activation to meet requirement for various applications.
3. Metal Housing : Prevents damage by eliminating exposed electronic components.
4. Autodiscriminates : Has the ability to scan all standard.



## 4.8.2 Technical Specifications

| | |
|---|---|
| **Operational** | |
| Light Source | Visible Laser Diode 650 nm ± 10 nm |
| Host System Interfaces | USB, RS232, Keyboard Wedge, Light Pen Emulation |
| **Mechanical** | |
| Dimensions (LxWxH) | 46.9 mm x 41 mm x 19.1 mm (1.85˝ x 1.61" x 0.75˝) |
| Weight | 55 g (1.94 oz) |
| Termination | IS4125: 12 pin ZIF connector; IS4110: 10 pin ZIF connector |
| **Electrical** | |
| Input Voltage | 5 VDC ± 0.25 V |
| Operating Current | 125 mA @ 5 VDC - typical |
| Idle Current | 65 mA @ 5 VDC - typical |
| Sleep Current | 9 mA @ 5 VDC - typical |
| Laser Class | Class 2: IEC60825-1, EN60825-1 |
| EMC | FCC Part 15, ICES-003, EN55022 Class A |
| **Environmental** | |
| Operating Temperature | -20°C to 50°C (-4°F to 122°F) |
| Storage Temperature | -40°C to 70°C (-40°F to 158°F) |
| Humidity | 5% to 95% relative humidity, non-condensing |
| Vibration | 7 G over 10-500 Hz |
| Light Levels | 4842 Lux (450 foot-candles) |
| **Scan Performance** | |
| Scan Pattern | Single scan line |
| Scan Speed | 52 scan lines per second |
| Sweep Angle | 56° |
| Print Contrast | 35% minimum reflectance difference |
| Tilt, Pitch, Skew | 42°, 68°, 52° |
| Decode Capability | Code 39, Code 93, Code 128, UPC/EAN/JAN, Code 2 of 5, Code 11, Codabar, MSI Plessey, GS1 DataBar, Telepen, Trioptic |

### 4.8.3 Disassembling the Bar Code Reader

1) Insert the key on rear door and turn it clockwise.
2) Turn power off
3) Open the doors of both sides with key.
4) Remove 2 screws and connectors to disassemble the Bar Code Reader.

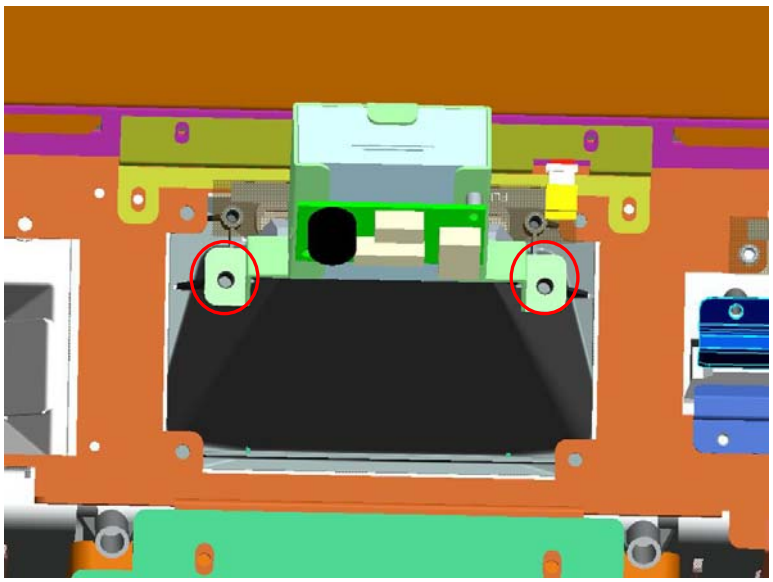


Fig 4.13 The disassembly procedure of bar code reader

5) Please use the reverse order to assemble the Bar Code Reader again.

## 4.9 Function Key

### 4.9.1 Function Key Code

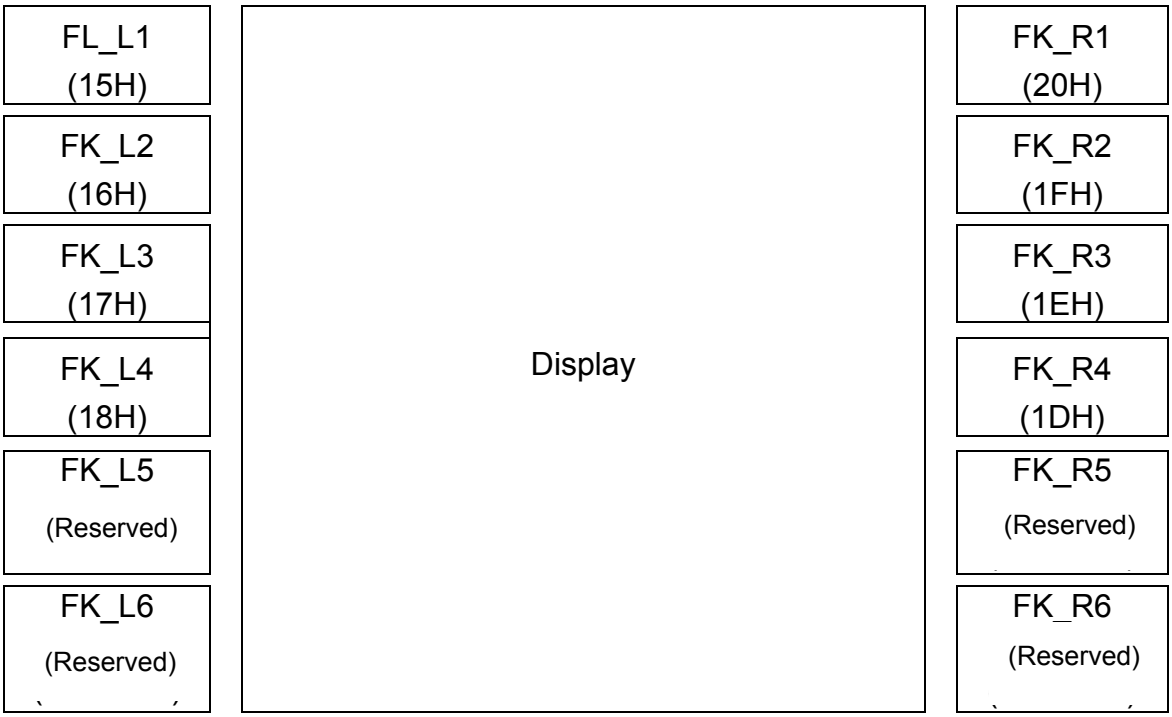
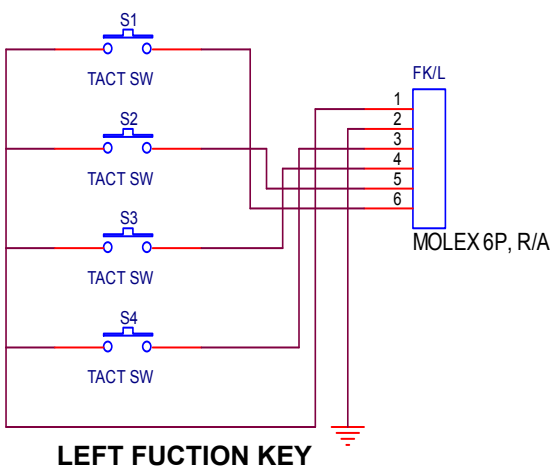


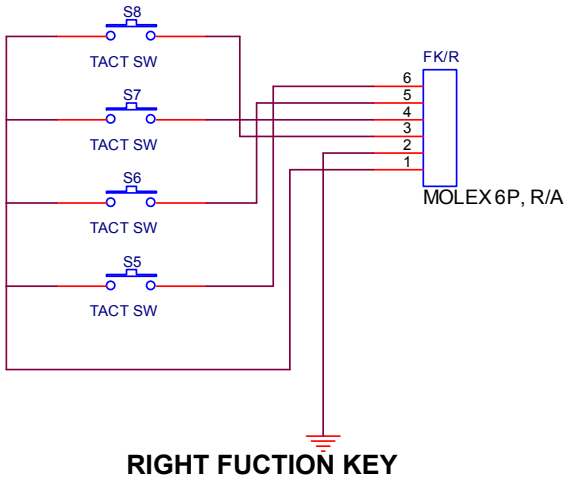

Fig 4.14 The arrangement diagram of Function Key

### 4.9.2 Hardware Configuration

The main role of this board is to input a lot of functions and information which customers want or select.




LEFT FUCTION KEY




RIGHT FUCTION KEY

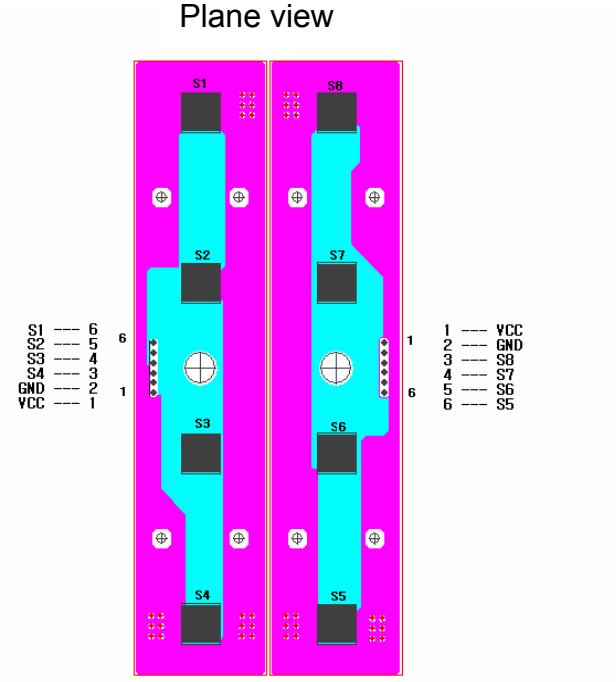
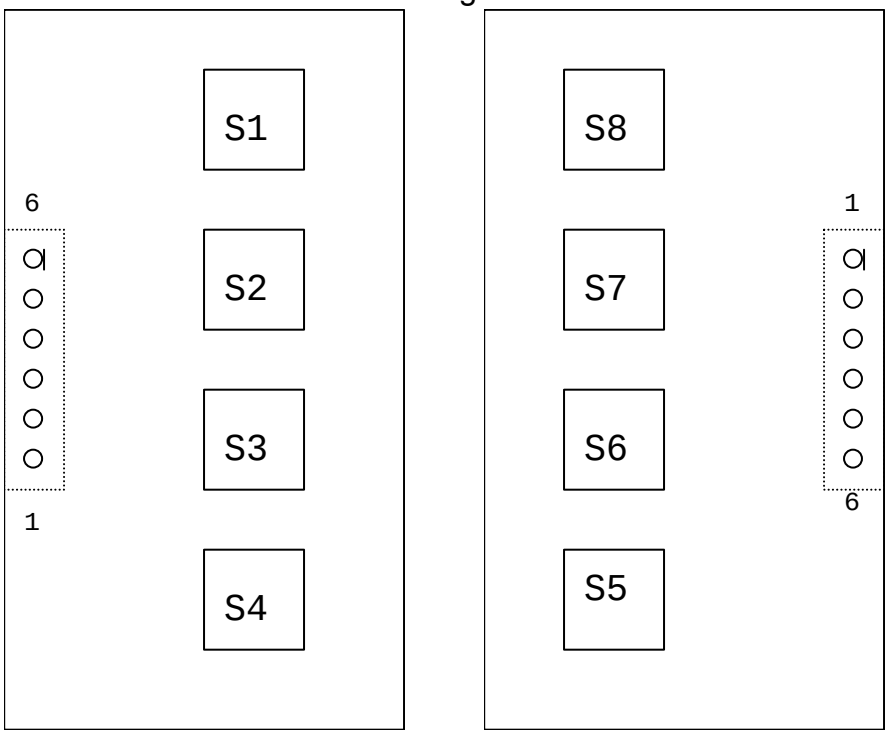



Fig 4.15 The PCB appearance in Function Key

### 4.9.3 Connector Configuration and Pin Specification

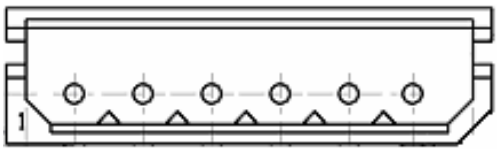
1) External interface connector diagram




**Left Function Key** **Right Function Key**

2) Pin specification

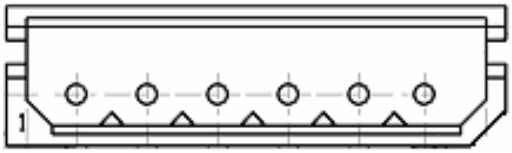
① FK_L (Function Key_Left): 33300906 (CONN:HDR:BOX:R/A:5268-06A:6P)




1 6

| Pin | Signal |
|---|---|
| 1 | VCC |
| 2 | GND |
| 3 | S4 |
| 4 | S3 |
| 5 | S2 |
| 6 | S1 |

② FK_R (Function Key_Right): 33300906 (CONN:HDR:BOX:R/A:5268-06A:6P)

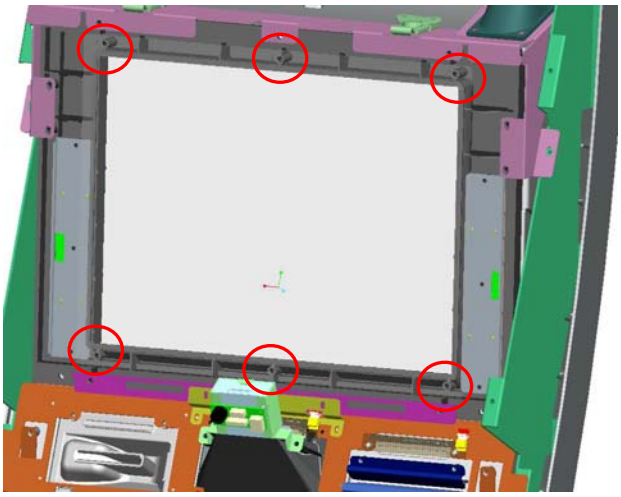



1 6

| Pin | Description |
|---|---|
| 1 | VCC |
| 2 | GND |
| 3 | S8 |
| 4 | S7 |
| 5 | S6 |
| 6 | S5 |

### 4.9.4 Disassembling the Function Key

1) Insert the key on rear door and turn it clockwise.
2) Turn power off
3) Open the doors of both sides with key.
4) Disassemble the LCD assembly referring to “4.2.1.5 Disassembling the LCD assembly”
5) Remove the acryl by unscrewing 6 screws as pictured below.



6) Removing 4 screws as pictured below.

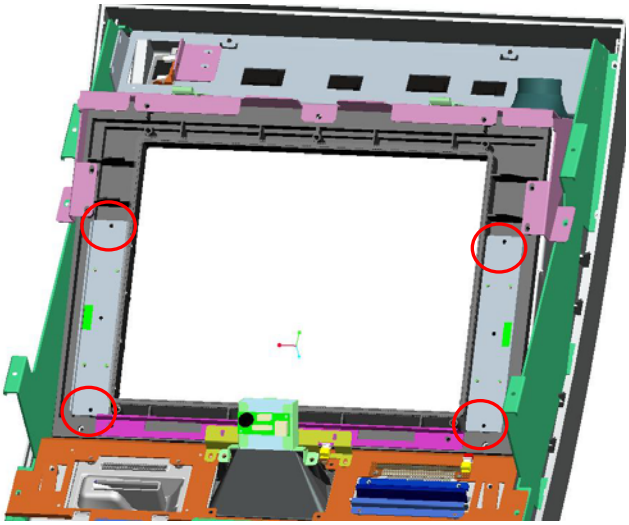


Fig 4.16 The disassembly procedure of Function Key

7) And then take out the Function keys and replace them with new ones.

Note : According to the assembly way, you can disassemble the function keys just by removing 3 screws on each function key without disassembling LCD assembly.

# Chapter 5. Enhanced Operator Panel

# 5.1 Operator Display

This monitor is a color active matrix TFT (Thin Film Transistor) liquid display that use amorphous silicon TFT switching devices. This monitor is composed of a TFT LCD panel, a driver circuit and a back-light system. The resolution of 15.0- inch contains 1,024 x 768 pixels and can display up to 16.2million colors and 1,500 nits brightness.

## 5.1.1 Disassembly and Assembly Procedure

1) Insert the key on the rear door of the ATM and turn it clockwise.
2) Then turn power off
3) Loosen three fixing bolts on the security cover.
4) Disconnect all cables including communication cable, data cable, power cable and so on carefully.
5) Take the module out and place a clean surface.

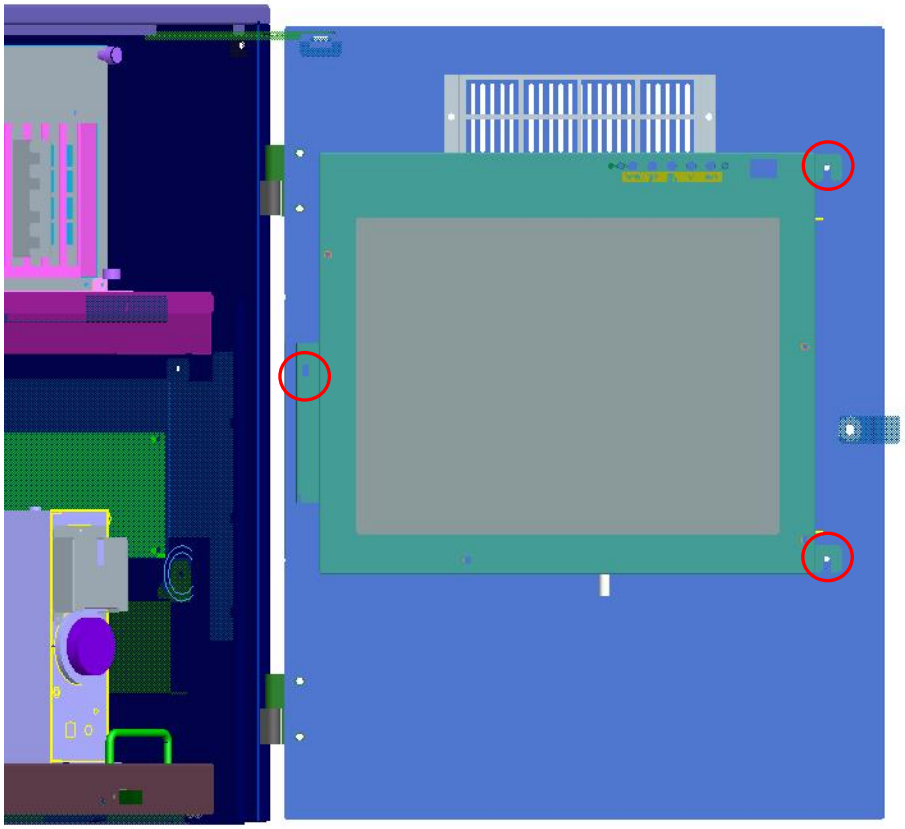


Fig 5.1 Disassembly Procedure of Rear Operator Panel 1

6) The boards on the rear of operator panel will be shown as pictured below.

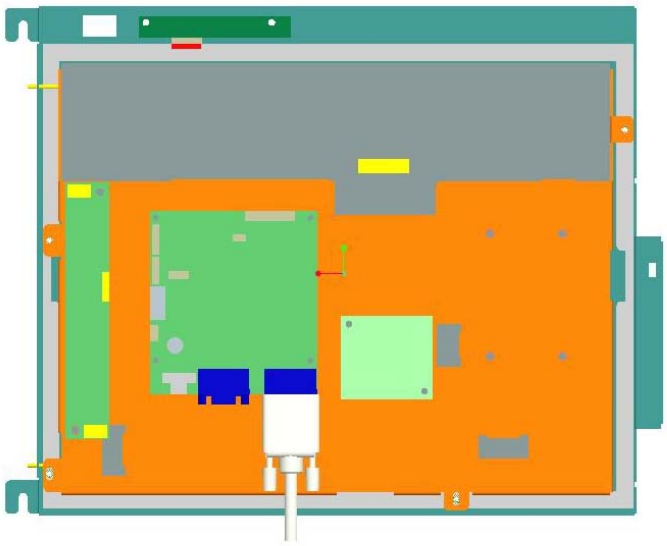


Fig 5.2 Disassembly Procedure of Rear Operator Panel 2

7) To remove the OSD board, SPL board, AD Conversion board or inverter board on the operator panel, just disconnect connectors and remove attaching screws
8) Use the reverse order of disassembly described above to assemble them again.

# 5.2 Boards

## 5.2.1 Inverter

The Inverter is a device generating a high alternating current (AC) from a low direct current (DC) to transmit it to backlight of LCD display. Don't touch a inverter when power is turned on.

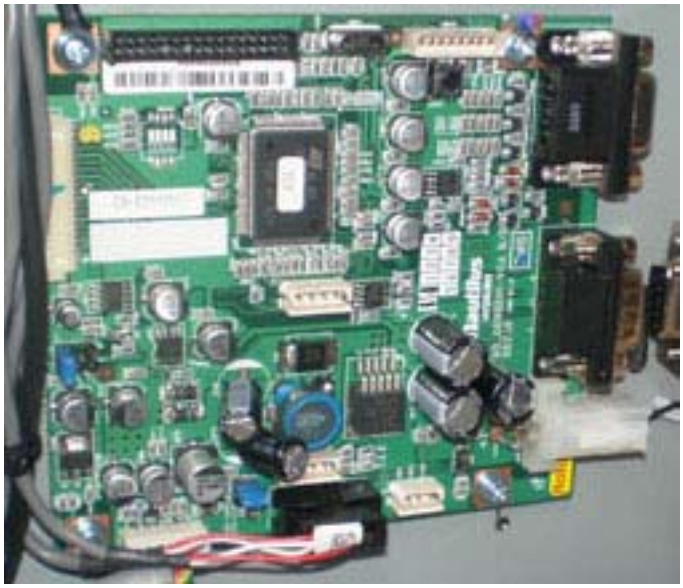
### 5.2.1.1 Appearance



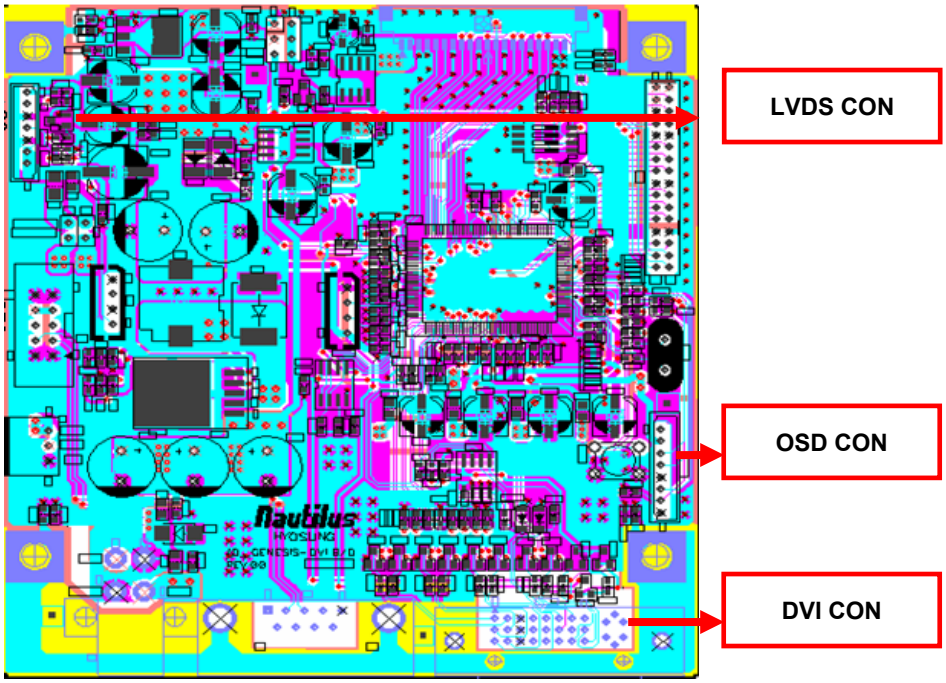

Fig 5.3 Appearance of inverter

## 5.2.2 AD Board

### 5.2.2.1 Appearance



### 5.2.2.2 Connectors on AD Board



## 5.2.3 OSD Board

### 5.2.3.1 OSD Board Mechanical Drawing

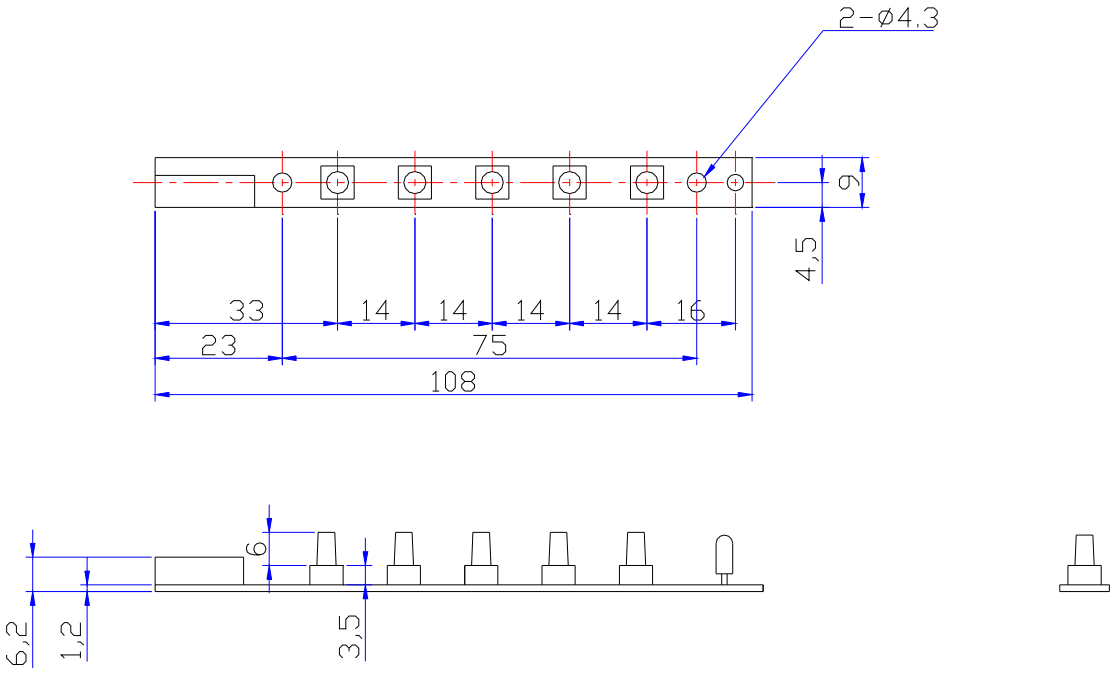



Fig. 5.4 OSD Board

### 5.2.3.2 Manipulation of the OSD

There are five OSD buttons that can control the monitor on the right side of the monitor.

① "Power" button: To turn on/off the monitor power
② "Menu" button: To open or exit OSD menus
③ "▲" button: To move a submenu under OSD menu to the right side or to increase the selected value
④ "▼" button: To move a submenu under OSD menu to the left side or to decrease the selected value
⑤ "Select" button:
-. Automatic control feature (hot key)
-. To select or exit a submenu under OSD menu
⑦ By pressing both "▲" button and "▼" button at the same time, the user can reset the OSD into the factory setting (with initialized ROM).

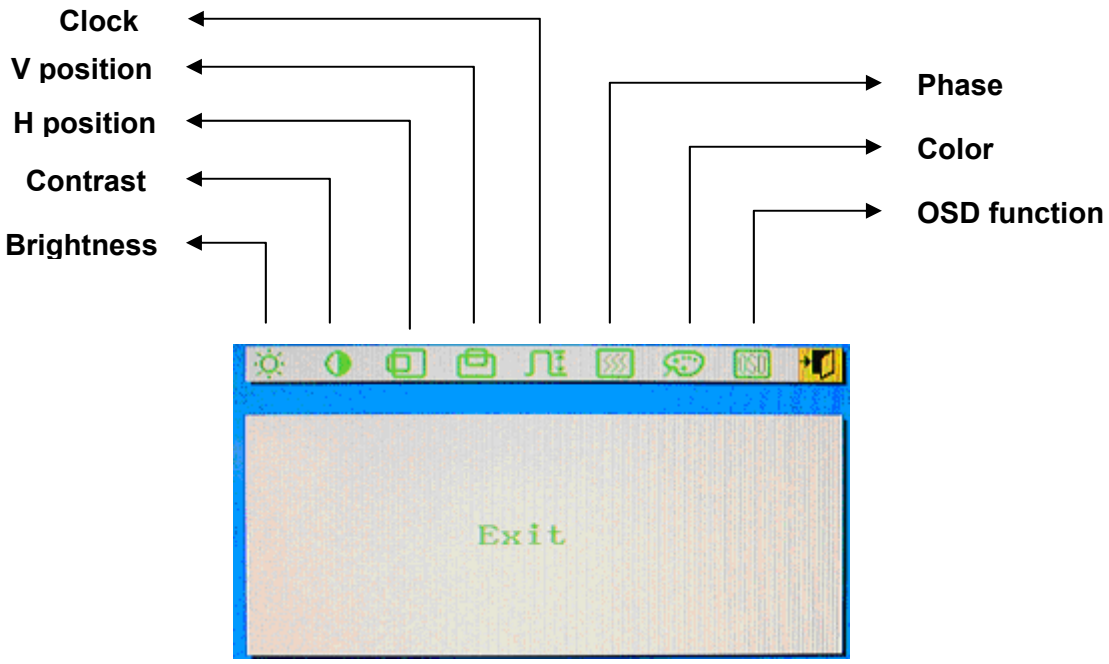



Fig. 5.5 OSD Manipulation

## Brightness

☞ To control the brightness of the monitor

① Select “Menu” on the OSD, and press “▲” and “▼” buttons to go to “Brightness” submenu. Then, press “Select” button.

② Adjust the brightness by pressing “▲” and “▼” buttons and press Menu button twice to exit the submenu.

## Contrast

☞ To control the contrast of the monitor

① Select “Menu” on the OSD, and press “▲” and “▼” buttons to go to “Contrast” submenu. Then, press “Select” button.

② Adjust the contrast by pressing “▲” and “▼” buttons and press Menu button twice to exit the submenu.

## Horizontal position

☞ To move the screen horizontally

① Select “Menu” on the OSD, and press “▲” and “▼” buttons to go to “H Position” submenu. Then, press “Select” button.

② Adjust the horizontal (H) position by pressing “▲” and “▼” buttons and press Menu button twice to exit

## Vertical position

☞ To move the screen vertically

① Select “Menu” on the OSD, and press “▲” and “▼” buttons to go to “V position” submenu. Then, press “Select” button.

② Adjust the vertical (H) position by pressing “▲” and “▼” buttons and press Menu button twice to exit the submenu.

## Image Clock

☞ To adjust the width of the screen

① Select “Menu” on the OSD, and press “▲” and “▼” buttons to go to “Clock” submenu. Then, press “Select” button.

② Adjust the clock value by pressing “▲” and “▼” buttons and press Menu button twice to exit the

## Phase Adjustment

☞ To adjust the phase on the screen

① Select “Menu” on the OSD, and press “▲” and “▼” buttons to go to “Phase” submenu. Then, press “Select” button.

② Adjust the phase value by pressing “▲” and “▼” buttons and press Menu button twice to exit the submenu.

☞ If the user presses only Select button once without selecting a menu, the phase ill be automatically

## Screen color

☞ To control the screen color

① Select “Menu” on the OSD, and press “▲” and “▼” buttons to go to “Color” submenu. Then, press “Select” button.

② Adjust the color temperature (9300 or 6500) by pressing “▲” and “▼” buttons or set the color gain of each color – R, G, and B – by selecting proper user menus. After adjusting the color, press Menu

#### 5.2.3.3 Message and LED Indicators of the OSD

**1) "No Input signal" message**

: This message is displayed when there is no signal input from the PC or video source or the cable is not connected.

☞ Check if the VGA cable is connected and the video card is properly inserted in the PC and if they are normally operating.

**2) "Out of Range" message**

: This message is displayed when the signal outputted by the PC is not in compliance with VESA standard or when the display setting of the video card is out of the signal range accommodated by the monitor. When this message is displayed, the user should check the resolution and the vertical frequency at Display Setup menu under Control Panel menu of the O/S of the PC and should change them properly.

☞ The recommended resolution is 800 x 600 and the vertical frequency is 60Hz for the display setting of this monitor.

**3) Sync LEDs**

-. Normal operation: Green
-. No signal: Orange
-. VGA cable cut or disconnection: Orange
-. Wrong resolution setting: Orange
-. No power supplied to the monitor: Off

# Chapter 6. Control Electronics

## 6.1 Appearance of Control Electronics

Control Electronics mainly consist of motherboard, HDD, ODD, multiple serial card, amplification card and etc.

Basic functions and usage of control electronics used this ATM is almost similar to that of personal computer you have dealt with in your office or your home except a multiple serial card used to communicated with some devices like cash dispenser, card reader, receipt printer, EPP.

The following picture will show you the manor component and location used in Control Electronics



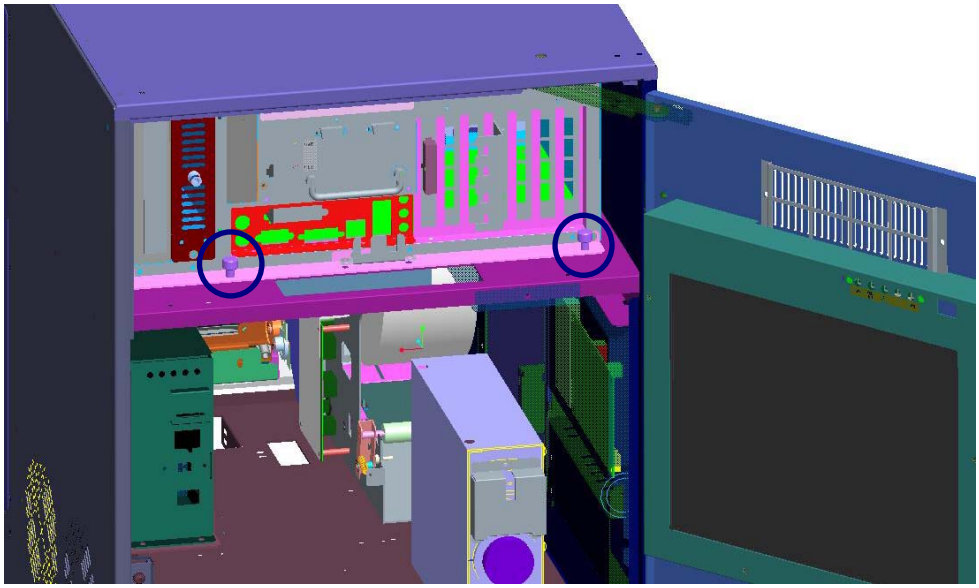
Fig. 6.1 (a) External Appearance : IOBP-945G



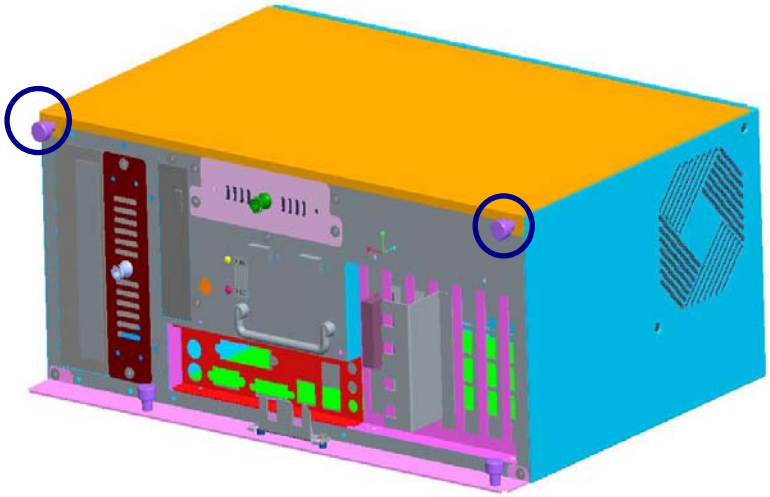
Fig. 6.1 (b) External Appearance : ECS EG31M

## 6.2 Disassembly/ Assembly Procedure of Control Electronics

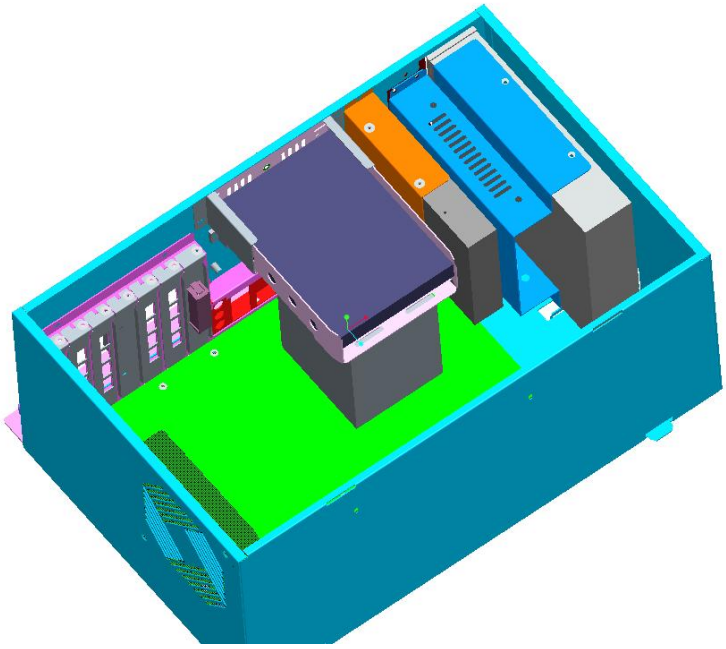
1) Insert the key on the rear door and turn it clockwise.
2) Open the rear door by pulling it out and turn power off.
3) Remove all of cables connected to the control electronics carefully not to hurt connector pins or each cable.
4) Remove two screws to take out the control electronics as pictured below.



5) Remove two thumb screws located on both side of the case.



6) The following figure represents the inside of Control Electronics after the cover is removed.



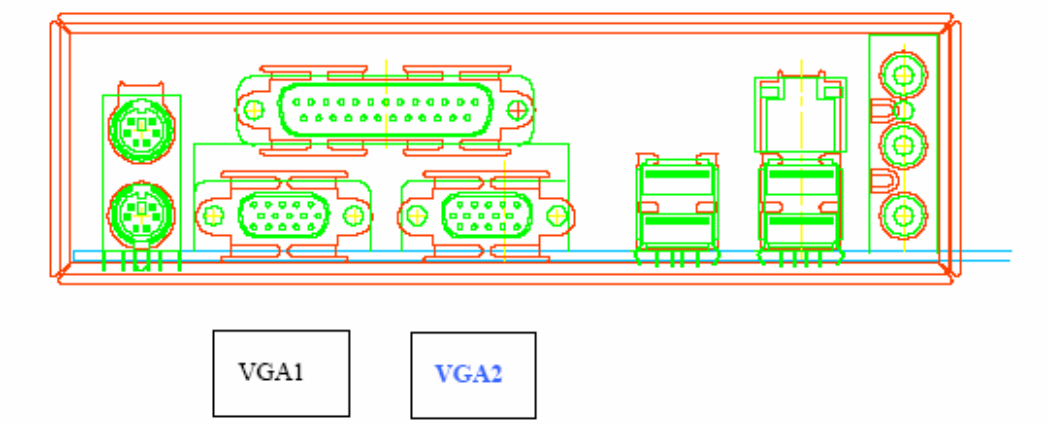
7) To take apart electronic board or card you want to replace, just disconnect cables or unscrew a couple of fixing screws

8) The assembly order is the opposite of the disassembling order.

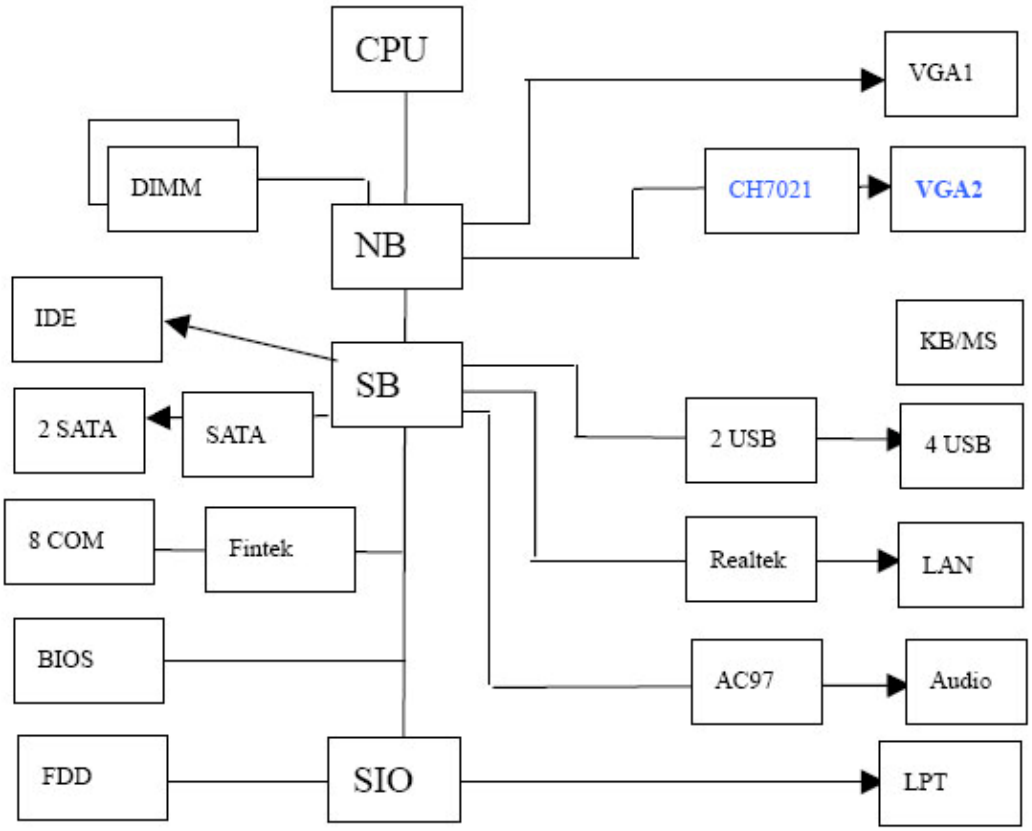
## 6.3 IOBP-945G

### 6.3.1 Main Board

### Placement for Rear Side




### Block Diagram



### 6.3.1.1 Specifications

| | |
|---|---|
| **CPU Type:** | LGA775 support Intel Pentium 4 / Celeron |
| **FSB:** | Support FSB 533/800/1066 |
| **System Memory:** | 2 x DDR2 DIMM support Dual-channel up to 2G |
| **System Chipset:** | Intel 945G + ICH7 |
| **VGA:** | Intel GMCH Integrated Graphics controller Dual independent displays |
| **Primary Display:** | VGA with D-SUB 15pin |
| **Secondary Display:** | GMCH SDVO Æ Chrontel CH7021 Æ VGA VGA output with D-SUB 15pin without DVI |
| **IO Chip:** | WINBOND 83627 |
| **Audio:** | AC97 with Lin-in, Lin-Out, Speak Out (50mW), by phone jack |
| **Network:** | BROADCOM PCI Express chipset with RJ-45 connector support 100/1000M Ethernet |
| **Hardware Monitor:** | Follow IEI standard |
| **IDE:** | 1 x ATA 100 with Box-header |
| **SATA:** | 2 x SATA with SATA connector |
| **Floppy:** | 1 channel with 2x17 box-header support 1 device |
| **USB:** | 6 port: 4 with USB stack type A, 2 with 2x5 pin header |
| **IrDA:** | None |
| **Series Port:** | 8 port RS-232 with Fintek chipset, by pin header COM1-COM2 pin9 jump select 5V/12V/Ring All function on ACPI model only |
| **Parallel Port:** | 1 port with D-SUB 25pin support SPP/EPP/ECP |
| **Keyboard & Mouse:** | 2 Mini DIN connector for PS/2 Keyboard and Mouse |
| **Digital I/O:** | None |
| **Watchdog Timer:** | Software programmable supports 1-255 level system reset (Minute / Second selection by Bios) |
| **Power Connector:** | 20 pin ATX12 connector |
| **Expansion Slot:** | 3 x PCI Slot |
| **BIOS:** | AMI or AWORD Flash BIOS |
| **Form Factor:** | 304 x 180 mm |
| **Environment:** | Operating Temp - 0 to 50 oC |
| | Storage Temp - -20 to 75 oC |
| **Operating System:** | Support Microsoft Windows XP |

#### 6.3.1.2 Introduction

A licensed copy of AMI BIOS is preprogrammed into the ROM BIOS. The BIOS setup program allows users to modify the basic system configuration. This chapter describes how to access the BIOS setup program and the configuration options that may be changed.

### Starting Setup

The AMI BIOS is activated when the computer is turned on. The setup program can be activated in one of two ways.

1) Press the **DELETE** key as soon as the system is turned on or
2) Press the **DELETE** key when the "**Press Del to enter SETUP**" message appears on the screen.

If the message disappears before, restart the computer and try again.

### Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the "+" and "-" keys to change entries, press **F1** for help and press **ESC** to quit. Navigation keys are shown in.

| BIOS Navigation Keys | Function |
|---|---|
| **Up arrow** | Move to previous item |
| **Down arrow** | Move to next item |
| **Left arrow** | Move to the item on the left hand side |
| **Right arrow** | Move to the item on the right hand side |
| **Esc key** | Main Menu – Quit and not save changes into CMOS<br>Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu |
| **"+" key** | Increase the numeric value or make changes |
| **"-" key** | Decrease the numeric value or make changes |
| **F1 key** | General help, only for Status Page Setup Menu and Option Page Setup Menu |
| **F2 /F3 key** | Change color from total 16 colors. F2 to select color forward. |
| **F10 key** | Save all the CMOS changes, only for Main Menu |

### Getting Help

When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **ESC** or the **F1** key again.

### Unable to Reboot after Configuration Changes

If the computer cannot boot after changes to the system configuration is made, CMOS defaults. Use the jumper.

#### 6.3.1.3 BIOS Menu Bar

The **menu bar** on top of the BIOS screen has the following main items:

Main Changes the basic system configuration.

Advanced Changes the advanced system settings.

Boot Changes the system boot configuration.

Security Sets User and Supervisor Passwords.

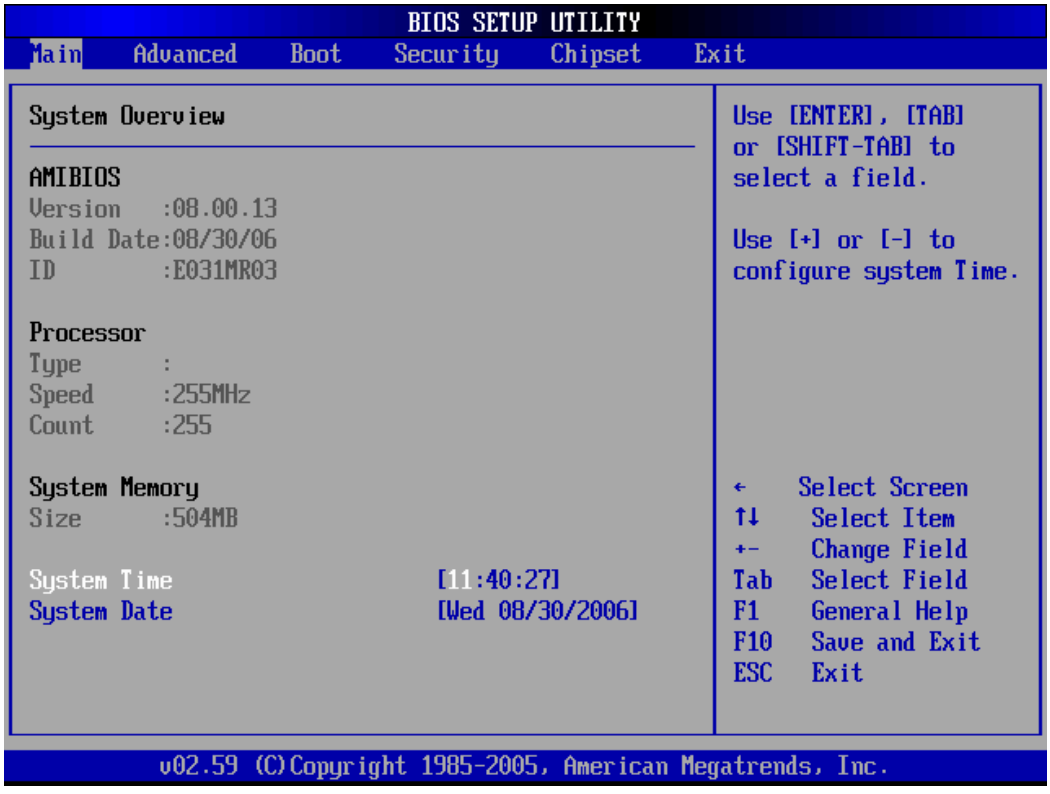
Chipset Changes the chipset settings.

Exit Selects exit options and loads default settings

The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

### Main

When the **BIOS Setup** program is entered, the **Main** menu (**BIOS Menu 1**) appears. The **Main** menu gives an overview of the basic system information.




**BIOS Menu 1: Main**

**System Overview**
The System Overview lists a brief summary of different system components. The fields in System Overview cannot be changed. The items shown in the system overview include:

| | |
|---|---|
| AMI BIOS: | Displays auto-detected BIOS information |
| Version: | Current BIOS version |
| Build Date: | Date the current BIOS version was made |
| ID: | Installed BIOS ID |
| Processor: | **Displays auto-detected CPU specifications** |
| Type: | Names the currently installed processor |
| Speed: | Lists the processor speed |
| Count: | The number of CPUs on the motherboard |
| **System Memory:** | **Displays the auto-detected system memory.** |
| Size: | Lists memory size |

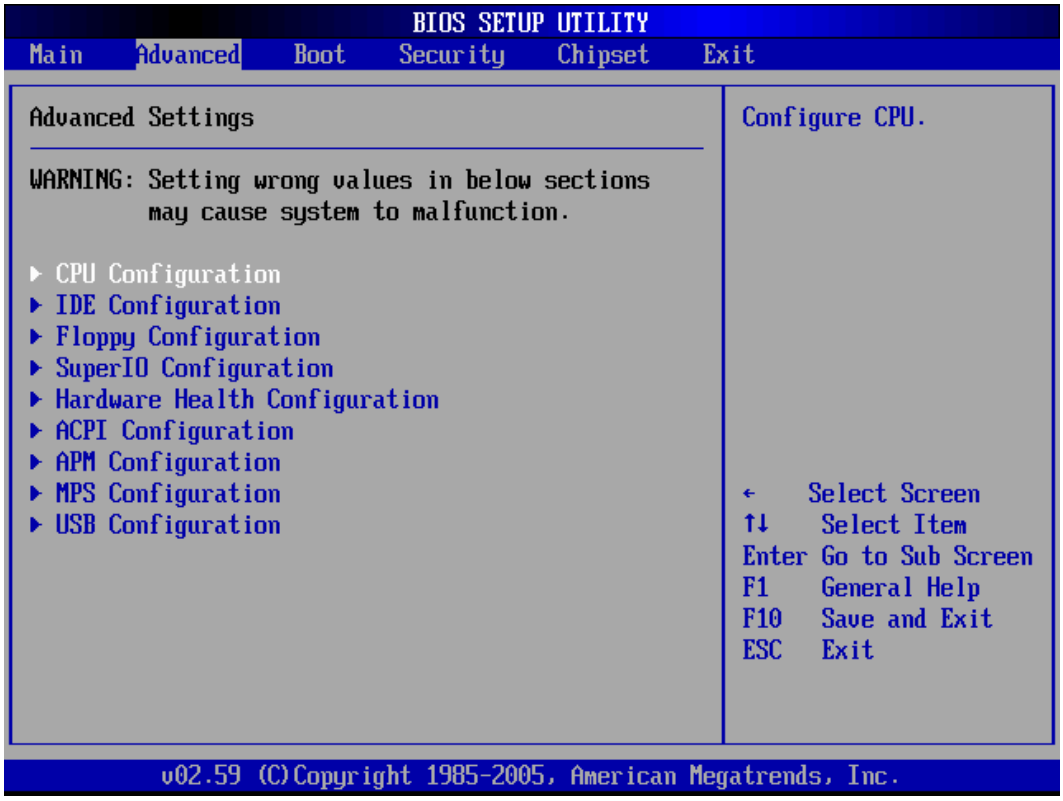
The **System Overview** field also has two user configurable fields:

**System Time [xx:xx:xx]:** The system time is set here.
**System Date [Day xx/xx/xxxx]:** The system date is set here.

## Advanced

The **Advanced** menu (**BIOS Menu 2**) allows access to the CPU and peripheral device configuration options through the following sub-menus:

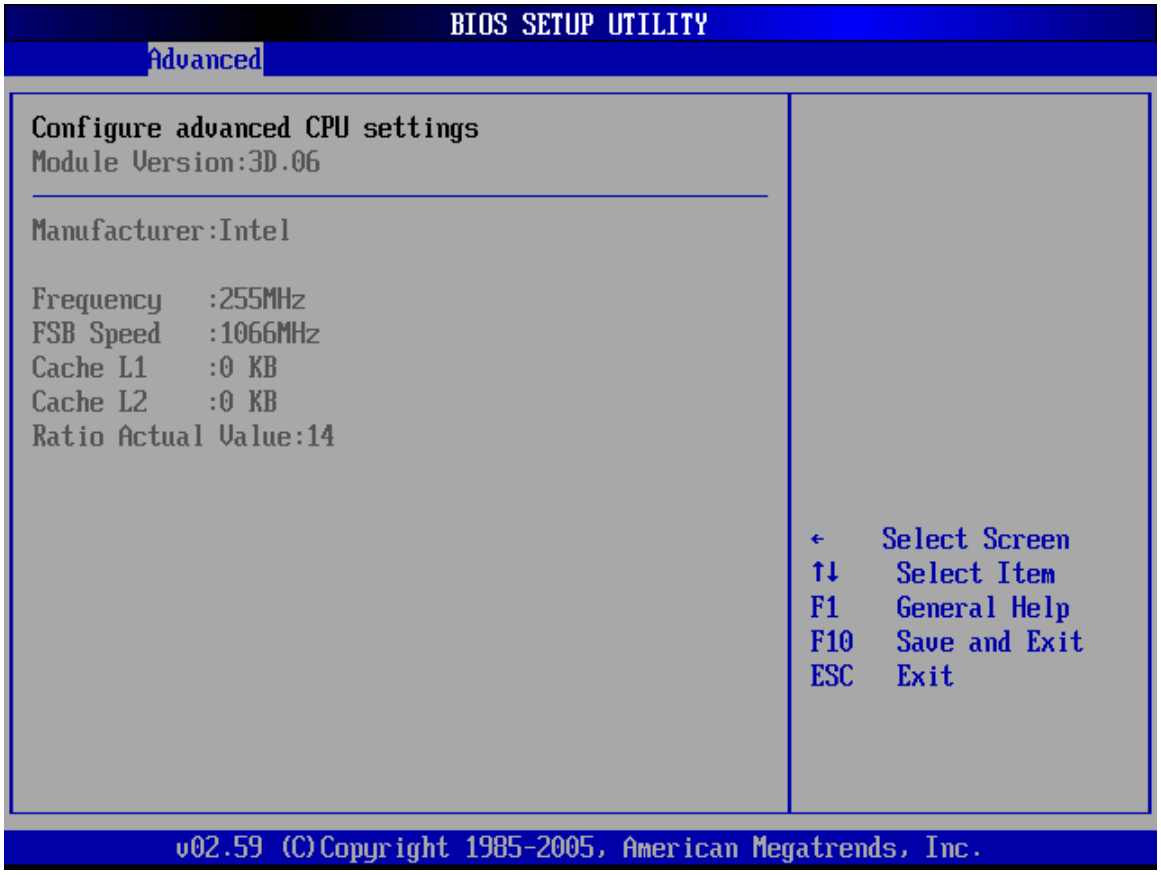
| | |
|---|---|
|  | **WARNING:**<br>Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware. |




**BIOS Menu 2: Advanced**

## CPU Configuration

The CPU Configuration menu (BIOS Menu 3) shows detailed CPU specifications and CPU configuration options.



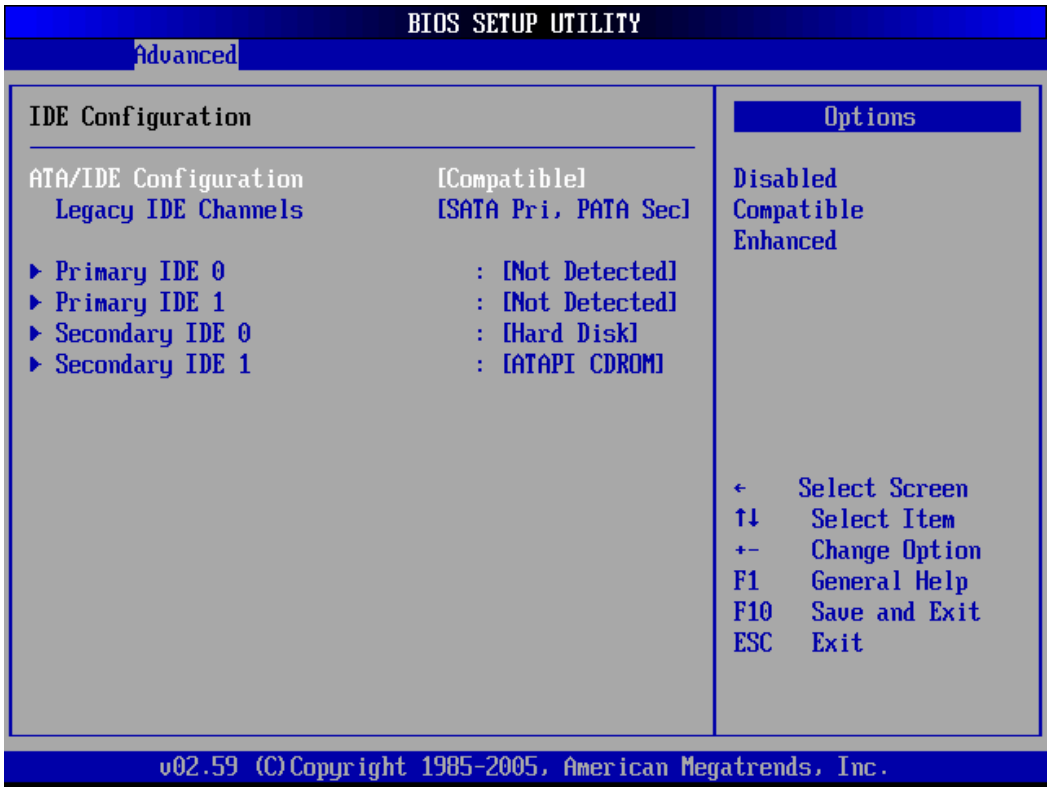

**BIOS Menu 3: CPU Configuration**

The CPU Configuration menu (**BIOS Menu 3**) lists the following CPU details:

| | |
|---|---|
| Manufacturer: | Lists the name of the CPU manufacturer |
| Brand String: | Lists the brand name of the CPU being used |
| Frequency: | Lists the CPU processing speed |
| FSB Speed: | Lists the FSB speed |
| Cache L1: | Lists the CPU L1 cache size |
| Cache L2: | Lists the CPU L2 cache size |

## IDE Configuration

The IDE Configuration menu (BIOS Menu 4) allows changes to the configurations for the IDE devices installed in the system.




**BIOS Menu 4: IDE Configuration**

### ATA/IDE Configuration [Compatible]

The ATA/IDE Configuration BIOS option allows the user to configure the ATA/IDE device mode.

| | | |
|---|---|---|
| Compatible | Default | Up to 6 HDDs can be used, four for SATA and the other for PATA IDE. If this option is selected, “Legacy IDE Channels” option is presented for configuration. |

### Legacy IDE Channels [SATA Pri, PATA Sec]

Use the Legacy IDE Channels option configures PATA and SATA resources for operating systems that require legacy IDE operation.

| | | |
|---|---|---|
| SATA Pri, PATA Sec | Default | This option allows the system to access the SATA devices before the primary IDE devices |

### IDE Master and IDE Slave

When entering setup, BIOS auto detects the presence of IDE devices. This displays the status of the auto detected IDE devices. The following IDE devices are detected and are shown in the **IDE Configuration** menu:

**- Primary IDE 0**

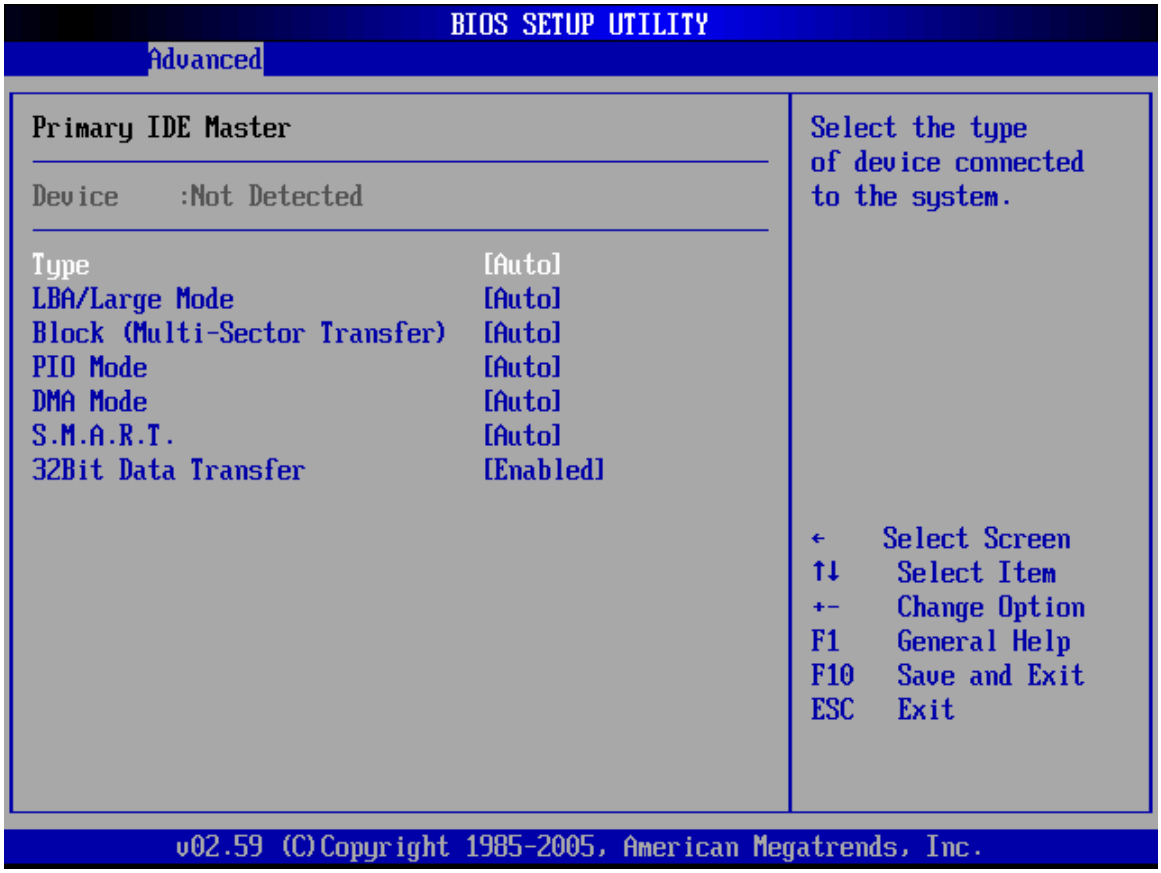
**- Primary IDE 1**

**- Secondary IDE 0**

**- Secondary IDE 1**

The **IDE Configuration** menu (**BIOS Menu 4**) allows changes to the configurations for the IDE device s installed in the system. If an IDE device is detected, and one of the above listed four BIOS configurat ion options are selected, the IDE configuration options shown in IDE Master, IDE Slave

IDE Master and IDE Slave configuration options for both primary and secondary IDE devices are shown in the BIOS menu below.




**BIOS Menu 5: IDE Master and IDE Slave Configuration**

### Auto-Detected Drive Parameters

The “grayed-out” items in the left frame are IDE disk drive parameters automatically detected from the firmware of the selected IDE disk drive. The drive parameters are listed as follows:

Device: Lists the device type (e.g. hard disk, CD-ROM etc.)

Vendor: Lists the device manufacturer

Size: The size of the device.
LBA Mode: Indicates whether the LBA (Logical Block Addressing) is a method of addressing data on a disk drive is supported or not.
Block Mode: Block mode boosts IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if block mode is not used. Block mode allows transfers of up to 64 KB per interrupt.
PIO Mode: Indicates the PIO mode of the installed device.
Async DMA: Indicates the highest Asynchronous DMA Mode that is supported.
Ultra DMA: Indicates the highest Synchronous DMA Mode that is supported.
S.M.A.R.T.: Indicates whether or not the Self-Monitoring Analysis and Reporting Technology protocol is supported.

**Type [Auto]**

The **Type** BIOS option determines the type of device that the AMIBIOS attempts to boot from after the Power-On Self-Test (POST) has completed.

| | | |
|---|---|---|
| Not Installed | | Selecting this value prevents the BIOS from searching for an IDE disk drive on the specified channel. |
| Auto | Default | This selection enables the BIOS to auto detect the IDE disk drive type attached to the specified channel. This setting should be used if an IDE hard disk drive is attached to the specified channel. |
| CD/DVD | | The CD/DVD option specifies that an IDE CD-ROM drive is attached to the specified IDE channel. The BIOS does not attempt to search for other types of IDE disk drives on the specified channel. |
| ARMD | | This option specifies an ATAPI Removable Media Device. These include, but are not limited to:<br>**ZIP**<br>**LS-120** |

### LBA/Large Mode [Auto]

The **LBA/Large Mode** BIOS option disables or auto detects LBA (Logical Block Addressing). LBA is a method of addressing data on a disk drive. In LBA mode, the maximum drive capacity is 137 GB.

| | | |
|---|---|---|
| Disabled | | This selection prevents the BIOS from using the LBA mode control on the specified channel. |
| Auto | Default | This option allows the BIOS to auto detect the LBA mode control on the specified channel. |

### Block (Multi Sector Transfer) [Auto]

| | | |
|---|---|---|
| Disabled | | Selecting this option prevents the BIOS from using Multi-Sector Transfer on the specified channel. The data to and from the device occurs one sector at a time. |
| Auto | Default | Selecting this value to allows the BIOS to auto detect the device support for Multi-Sector Transfers on the specified channel. If supported. Select this value to allow the BIOS to auto detect the number of sectors per block for transfer from the hard disk drive to the memory. The data transfer to and from the device occurs multiple sectors at a time. |

### PIO Mode [Auto]

The **PIO Mode** option selects the IDE PIO (Programmable I/O) mode program timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases.

| | | |
|---|---|---|
| Auto | Default | This setting allows the BIOS to auto detect the PIO mode. Use this value if the IDE disk drive support cannot be determined. |
| 0 | | PIO mode 0 selected with a maximum transfer rate of 3.3MBps |
| 1 | | PIO mode 1 selected with a maximum transfer rate of 5.2MBps |
| 2 | | PIO mode 2 selected with a maximum transfer rate of 8.3MBps |
| 3 | | PIO mode 3 selected with a maximum transfer rate of 11.1MBps |
| 4 | | PIO mode 4 selected with a maximum transfer rate of 16.6MBps |
| | | (This setting generally works with all hard disk drives manufactured after 1999. For other disk drives, such as IDE CD-ROM drives, check the specifications of the drive.) |

### DMA Mode [Auto]

The **DMA Mode** BIOS selection adjusts the DMA mode options.

| | | |
|---|---|---|
| Auto | Default | The BIOS auto detects the DMA mode. Use this value if the IDE disk drive support cannot be determined. |

### S.M.A.R.T [Auto]

Self-Monitoring Analysis and Reporting Technology (SMART) feature can help predict impending drive failures. The **S.M.A.R.T** BIOS option enables or disables this function.

| | | |
|---|---|---|
| Auto | Default | BIOS to auto detects if the hard disk drive supports S.M.A.R.T. Use this setting if the IDE disk drive support cannot be determined. |
| Disabled | | Select this value to prevent the BIOS from using the SMART feature. |
| Enabled | | Select this value to allow the BIOS to use the SMART feature on support hard disk drives. |

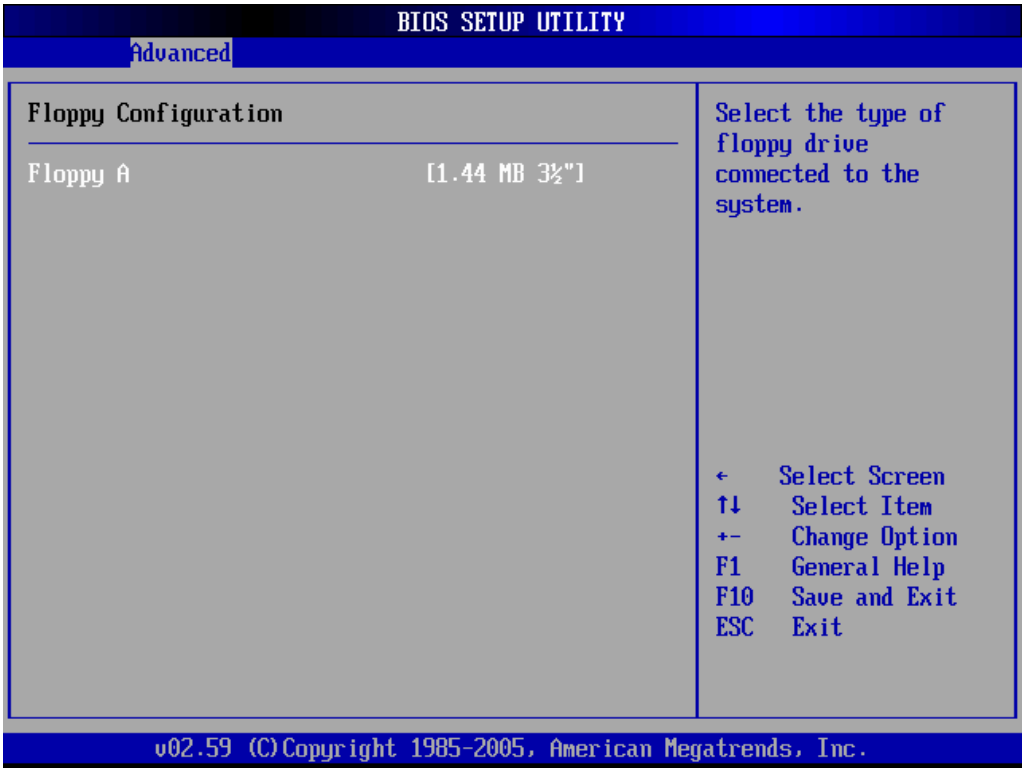
### 32Bit Data Transfer [Enabled]

The **32Bit Data Transfer** BIOS option enables or disables 32-bit data transfers.

| | | |
|---|---|---|
| Disabled | | Prevents the BIOS from using 32-bit data transfers. |
| Enabled | Default | Allows BIOS to use 32-bit data transfers on support hard disk drives. |

## Floppy Configuration

Use the Floppy Configuration menu (BIOS Menu 6) to set or change the configurations for floppy disk drives.




**BIOS Menu 6: Floppy Configuration**

**Floppy A [1.44 MB 3½"]**

The **Floppy A** configuration option determines the types of the floppy drive installed in the system. The following configuration options are available.

**Disabled (default)**

**360 KB 5¼"**

**1.2 MB 5¼"**

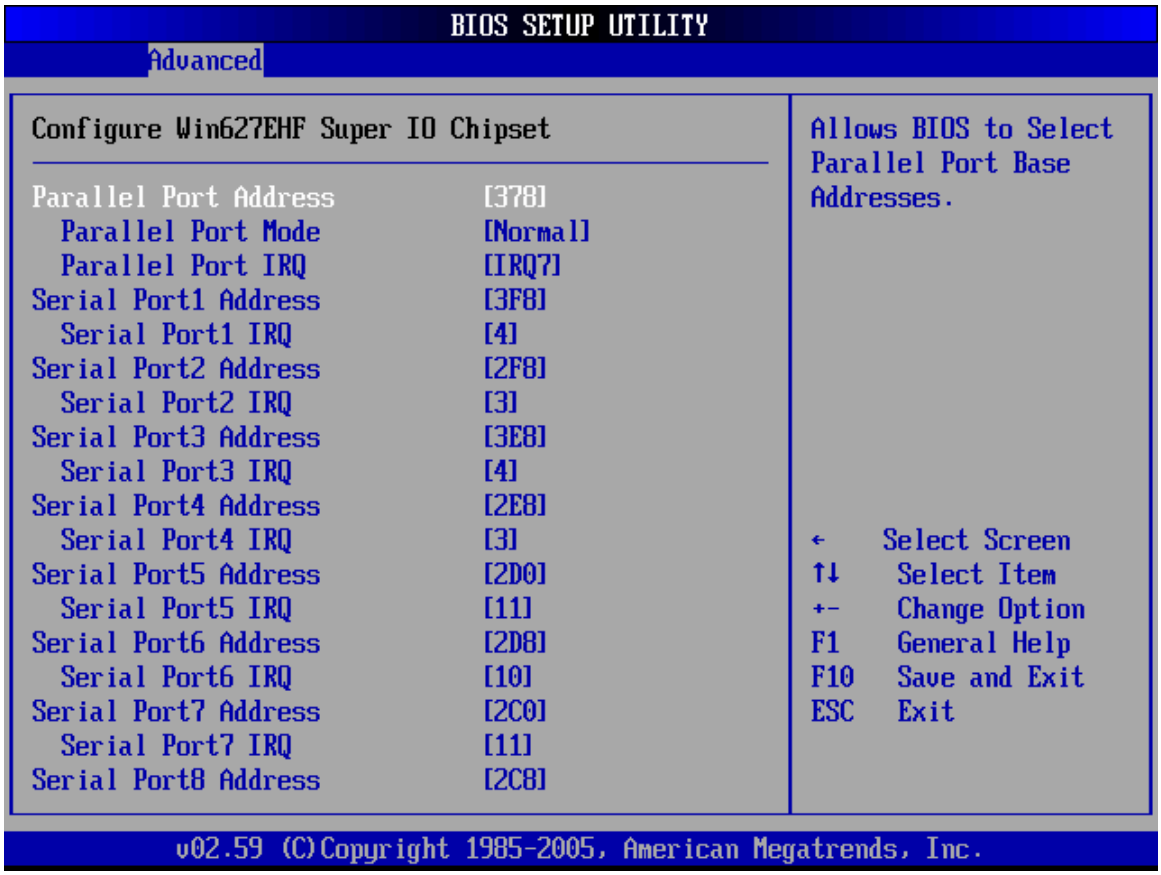
**720 KB 3 ½"**

**1.44 MB 3½"**

**2.88 MB 3½"**

## Super IO Configuration

The **Super IO Configuration** menu (**BIOS Menu 7**) sets or changes the configurations for the FDD controllers, parallel ports and serial ports.




**BIOS Menu 7: Super IO Configuration**

### Serial Port1 Address [3F8]

This option allows BIOS to select the base addresses for serial port 1

| | | |
|---|---|---|
| Disabled | | No base address is assigned to serial port 3 |
| 3F8 | Default | Serial port 3 I/O port address is 3F8 |

### Serial Port1 IRQ [4]

The **Serial Port1 IRQ** selection sets the interrupt address for serial port 1.

| | | |
|---|---|---|
| 3 | | Serial port 1 IRQ address is 3 |
| 4 | Default | Serial port 1 IRQ address is 4 |

**Serial Port2 Address [3E8]**

This option allows BIOS to select the base addresses for serial port 2

| | | |
|---|---|---|
| Disabled | | No base address is assigned to serial port 3 |
| 3E8 | Default | Serial port 3 I/O port address is 3E8 |

**Serial Port2 IRQ [4]**

The **Serial Port2 IRQ** selection sets the interrupt address for serial port 2.

| | | |
|---|---|---|
| 3 | Default | Serial port 2 IRQ address is 3 |
| 4 | | Serial port 2 IRQ address is 4 |

**Parallel Port Address [378]**

This option allows BIOS to select the base addresses for the Parallel Port

| | | |
|---|---|---|
| Disabled | | No base address is assigned to the Parallel Port |
| 378 | Default | Parallel Port I/O port address is 378 |
| 278 | | Parallel Port I/O port address is 278 |
| 3BC | | Parallel Port I/O port address is 3BC |

**Parallel Port Mode [Normal]**

The Parallel Port Mode selection selects the mode the parallel port operates in.

| | | |
|---|---|---|
| Normal | Default | The normal parallel port mode is the standard mode for parallel port operation. |
| EPP | | The parallel port operates in the enhanced parallel port mode (EPP). The EPP mode supports bi-directional communication between the system and the parallel port device and the transmission rates between the two are much faster than the Normal mode. |
| ECP | | The parallel port operates in the extended capabilities port (ECP) mode. The ECP mode supports bi-directional communication between the system and the parallel port device and the transmission rates between the two are much faster than the Normal mode |
| EPP+ECP | | The parallel port becomes compatible with EPP and ECP devices described above |

**Parallel Port IRQ [IRQ7]**

The **Parallel Port Address** BIOS option assigns the parallel port interrupt address. The following address options are available.

| | |
|---|---|
| IRQ5 | Parallel port interrupt address is IRQ5 |

| | | |
|---|---|---|
| IRQ7 | Default | Parallel port interrupt address is IRQ7 |

**Serial Port3 Address [3E8]**

This option allows BIOS to select the base addresses for serial port 3

| | | |
|---|---|---|
| Disabled | | No base address is assigned to serial port 3 |
| 3E8 | Default | Serial port 3 I/O port address is 3E8 |

**Serial Port3 IRQ [4]**

The Serial Port3 IRQ selection sets the interrupt address for serial port 3.

| | | |
|---|---|---|
| 3 | | Serial port 3 IRQ address is 10 |
| 4 | Default | Serial port 3 IRQ address is 11 |

**Serial Port4 Address [2E8]**

This option allows BIOS to select the base addresses for serial port 4.

| | | |
|---|---|---|
| Disabled | | No base address is assigned to serial port 4 |
| 2E8 | Default | Serial port 4 I/O port address is 2E8 |

**Serial Port4 IRQ [10]**

The **Serial Port4 IRQ** selection sets the interrupt address for serial port 4.

| | | |
|---|---|---|
| 3 | Default | Serial port 4 IRQ address is 10 |
| 4 | | Serial port 4 IRQ address is 11 |

**Serial Port5 Address [2D0]**

This option allows BIOS to select the base addresses for serial port 5.

| | | |
|---|---|---|
| Disabled | | No base address is assigned to serial port 5 |
| 2D0 | Default | Serial port 5 I/O port address is 2D0 |

**Serial Port5 IRQ [11]**

The **Serial Port5 IRQ** selection sets the interrupt address for serial port 5.

| | | |
|---|---|---|
| 10 | | Serial port 5 IRQ address is 10 |
| 11 | Default | Serial port 5 IRQ address is 11 |

**Serial Port6 Address [2D8]**

This option allows BIOS to select the base addresses for serial port 6.

| | | |
|---|---|---|
| Disabled | | No base address is assigned to serial port 6 |

| | | |
|---|---|---|
| 2D80 | Default | Serial port 6 I/O port address is 2D8 |

**Serial Port6 IRQ [10]**

The **Serial Port6 IRQ** selection sets the interrupt address for serial port 6.

| | | |
|---|---|---|
| 10 | Default | Serial port 6 IRQ address is 10 |
| 11 | | Serial port 6 IRQ address is 11 |

**Serial Port7 IRQ [11]**

The **Serial Port7 IRQ** selection sets the interrupt address for serial port 7.

| | | |
|---|---|---|
| 10 | | Serial port 7 IRQ address is 10 |
| 11 | Default | Serial port 7 IRQ address is 11 |

**Serial Port7 Address [2C8]**

This option allows BIOS to select the base addresses for serial port 7.

| | | |
|---|---|---|
| Disabled | | No base address is assigned to serial port 7 |
| 2C0 | Default | Serial port 7 I/O port address is 2C0 |

**Serial Port8 IRQ [10]**

The **Serial Port8 IRQ** selection sets the interrupt address for serial port 8.

| | | |
|---|---|---|
| 10 | Default | Serial port 8 IRQ address is 10 |
| 11 | | Serial port 8 IRQ address is 11 |

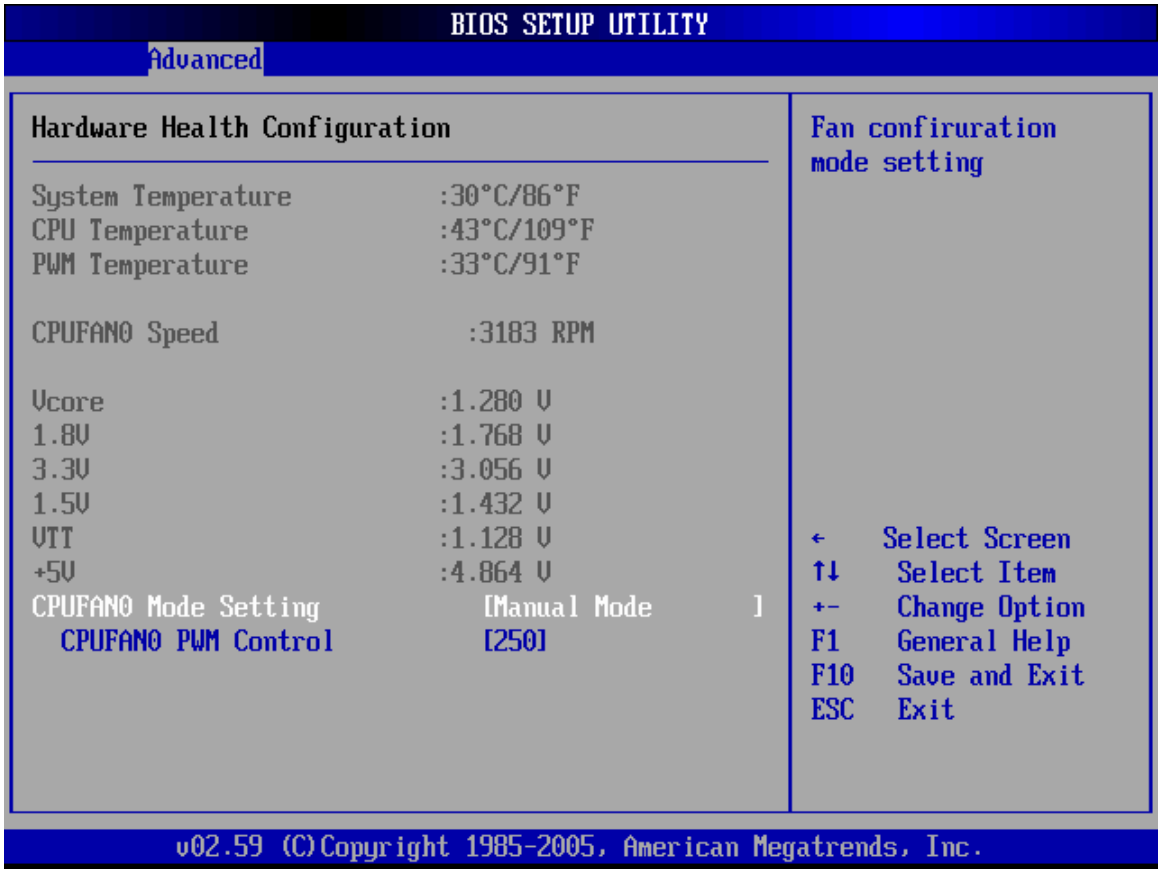
**Serial Port8 Address [2C8]**

This option allows BIOS to select the base addresses for serial port 8.

| | | |
|---|---|---|
| Disabled | | No base address is assigned to serial port 8 |
| 2D80 | Default | Serial port 8 I/O port address is 2C8 |

## Hardware Health Configuration

The **Hardware Health Configuration** menu (**BIOS Menu 8**) shows the operating temperature, fan speeds and system voltages.




**BIOS Menu 8: Hardware Health Configuration**

The following system parameters and values are shown. The system parameters that are monitored are:

**System Temperatures: The following system temperatures are monitored**

CPU Temperature

System Temperature

**Fan Speeds: The CPU cooling fan speed is monitored.**

Fan1 Speed

Fan2 Speed

Fan3 Speed

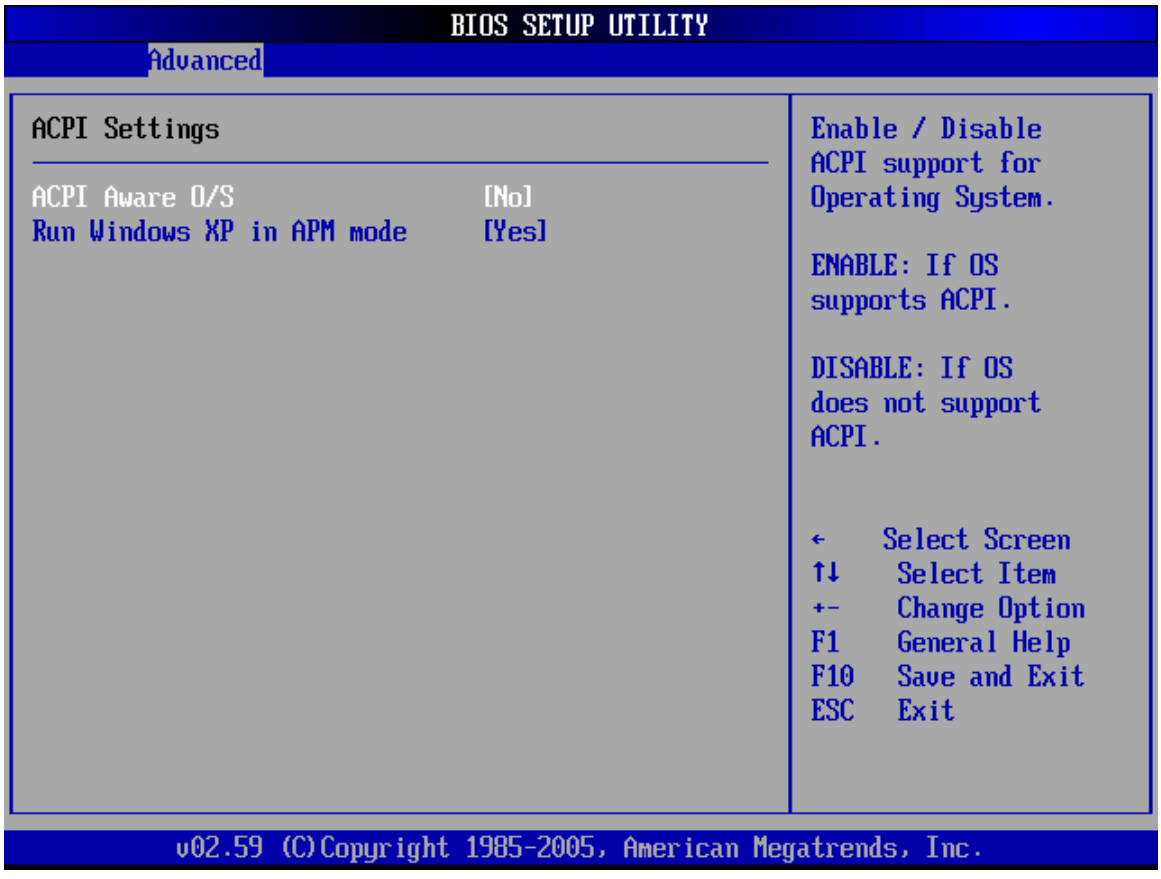
**Voltages: The following system voltages are monitored**

CPU Core

DRAM Vcc
+3.30V
+5.00V
+12V
FSB Vcc +1.20V
+1.50V
VBAT

## ACPI Configuration

The **ACPI Configuration** menu (**BIOS Menu 9**) configures the Advanced Configuration and Power Interface (ACPI) and Power Management (APM) options.


BIOS SETUP UTILITY
Advanced
ACPI Settings
ACPI Aware O/S [No]
Run Windows XP in APM mode [Yes]
Enable / Disable ACPI support for Operating System.
ENABLE: If OS supports ACPI.
DISABLE: If OS does not support ACPI.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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**BIOS Menu 9: ACPI Configuration**

### ACPI Aware O/S [No]

Use the **ACPI Aware O/S** option to enable the system to configure ACPI power saving options. ACPI can only be implemented if the system OS complies with the ACPI standard. Windows 98, Windows

2000, and Windows XP all comply with ACPI.

| | | |
|---|---|---|
| No | Default | Disables the ACPI support for the OS. This selection should be disabled if the OS does not support ACPI |
| Yes | | Enables the ACPI support for the operating system. This selection should be enabled if the OS does support ACPI |

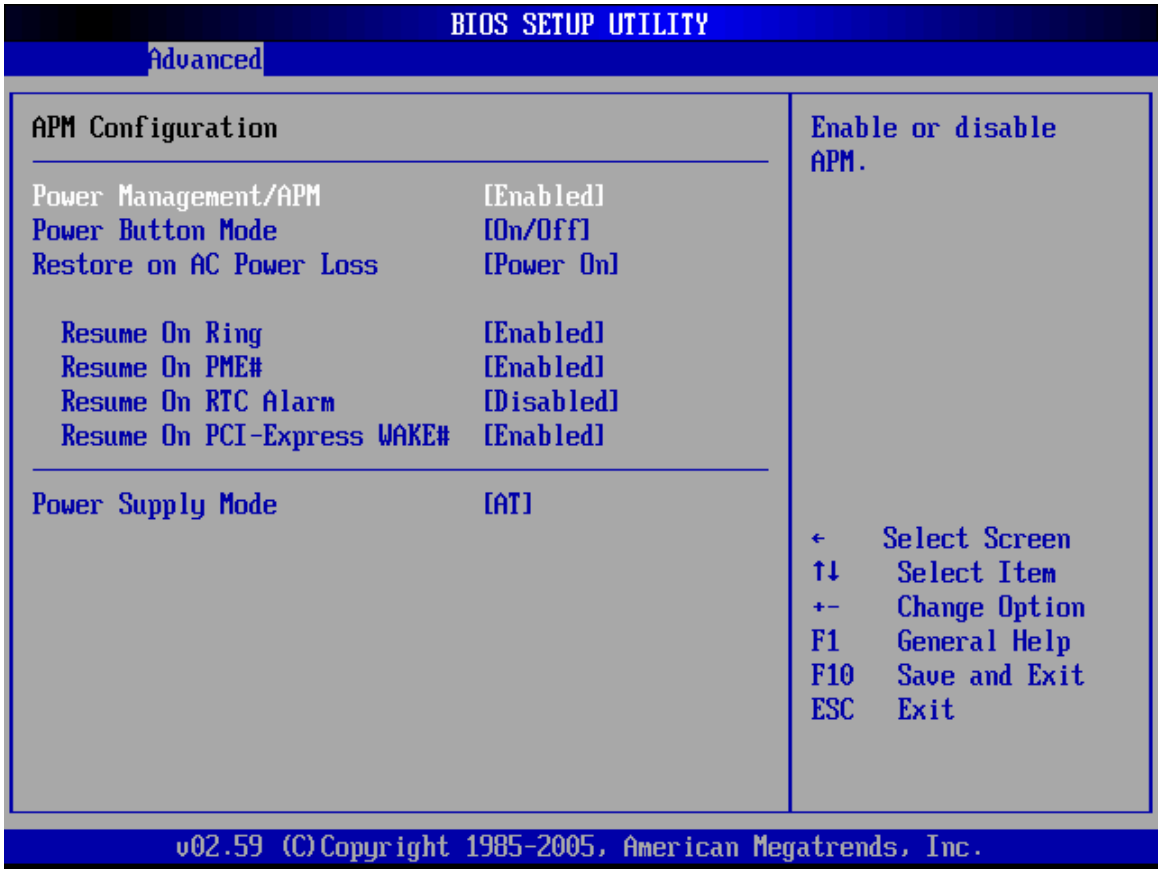
**Run Windows XP in APM mode [Yes]**

For support customer's request support APM mode in Windows XP

| | | |
|---|---|---|
| No | | Disables the APM mode support for the operating system. |
| Yes | Default | Enables the APM mode support for the operating system. |

## APM Configuration

Use the **APM Configuration** menu (**BIOS Menu 10**) to select the advanced power management.




**BIOS Menu 10: APM Configuration**

**Power Management/APM [Enabled]**

The **Power Management/APM** BIOS option accesses the advanced power management features.

| | | |
|---|---|---|
| Disabled | | Disables the Advanced Power Management (APM) feature |
| Enabled | Default | Enables the APM feature |

**Power Button Mode [On/Off]**

The **Power Button Mode** BIOS specifies how the power button functions.

| | | |
|---|---|---|
| On/Off | Default | When the power button is pressed the system is either turned on or off |
| Suspend | | When the power button is pressed the system goes into suspend mode |

**Restore on AC Power Loss [Last State]**

The Restore on AC Power Loss BIOS option specifies what state the system returns to if there is a sudden loss of power to the system.

| | | |
|---|---|---|
| Power Off | | The system remains turned off |
| Power On | | The system turns on |
| Last State | Default | The system returns to its previous state. If it was on, it turns itself on. If it was off, it remains off. |

**Resume on Ring [Enabled]**

The **Resume on Ring** BIOS option specifies if the system will be roused from a suspended or standby state when there is activity on the RI (ring in) modem line. That is, the system will be roused by an incoming call on a modem.

| | | |
|---|---|---|
| Disabled | | Wake event not generated by an incoming call |
| Enabled | Default | Wake event generated by an incoming call |

**Resume on PME# [Enabled]**

The **Resume on PME#** BIOS option specifies if the system will be roused from a suspended or standby state when there is activity on the PCI PME (power management event) controller.

| | | |
|---|---|---|
| Disabled | | Wake event not generated by PCI PME controller activity |
| Enabled | Default | Wake event generated by PCI PME controller activity |

**Resume On RTC Alarm [Disabled]**

The **Resume On RTC Alarm** determines when the computer will be roused from a suspended state.

| | | |
|---|---|---|
| Disabled | Default | The real time clock (RTC) cannot generate a wake event |
| Enabled | | If selected, the following will appear with values that can be selected: |

**RTC Alarm Date (Days)**

**System Time**

After setting the alarm, the computer will turn itself on from a suspend state when the alarm goes off.

**Resume On PCI-Express WAKE# [Enabled]**

The **Resume On PCI-Express WAKE#** BIOS option specifies if the system will be roused from a suspended or standby state when there is activity on the PCI-Express controller.

| | | |
|---|---|---|
| Disabled | | Wake event not generated by PCI-Express controller activity |
| Enabled | Default | Wake event generated by PCI-Express controller activity |

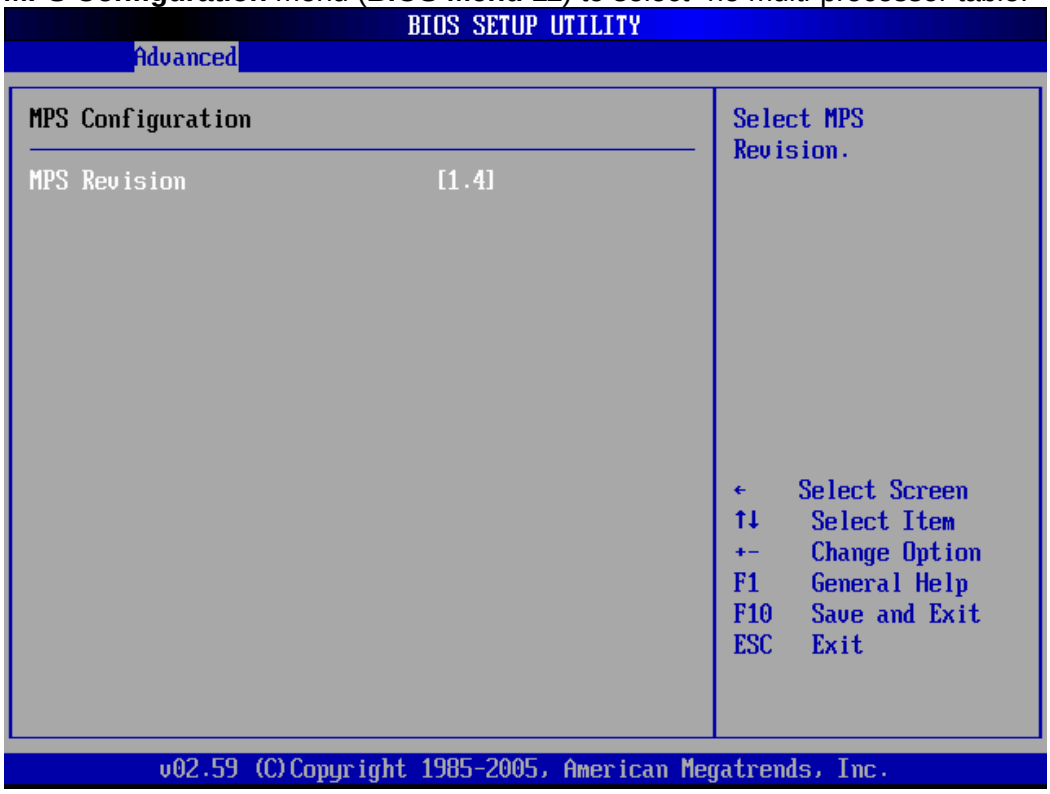
**Power supply mode [AT]**

The **Power supply mode** BIOS option specifies if the system need to running AT type shut-down for customer's special requirement!

| | | |
|---|---|---|
| AT | Default | For support AT power Supply & AT type shut-down |
| ATX | | For support normally ATX power Supply |

**MPS Configuration**

Use the **MPS Configuration** menu (**BIOS Menu 11**) to select `he multi-processor table.




**BIOS Menu 11: MPS Configuration**

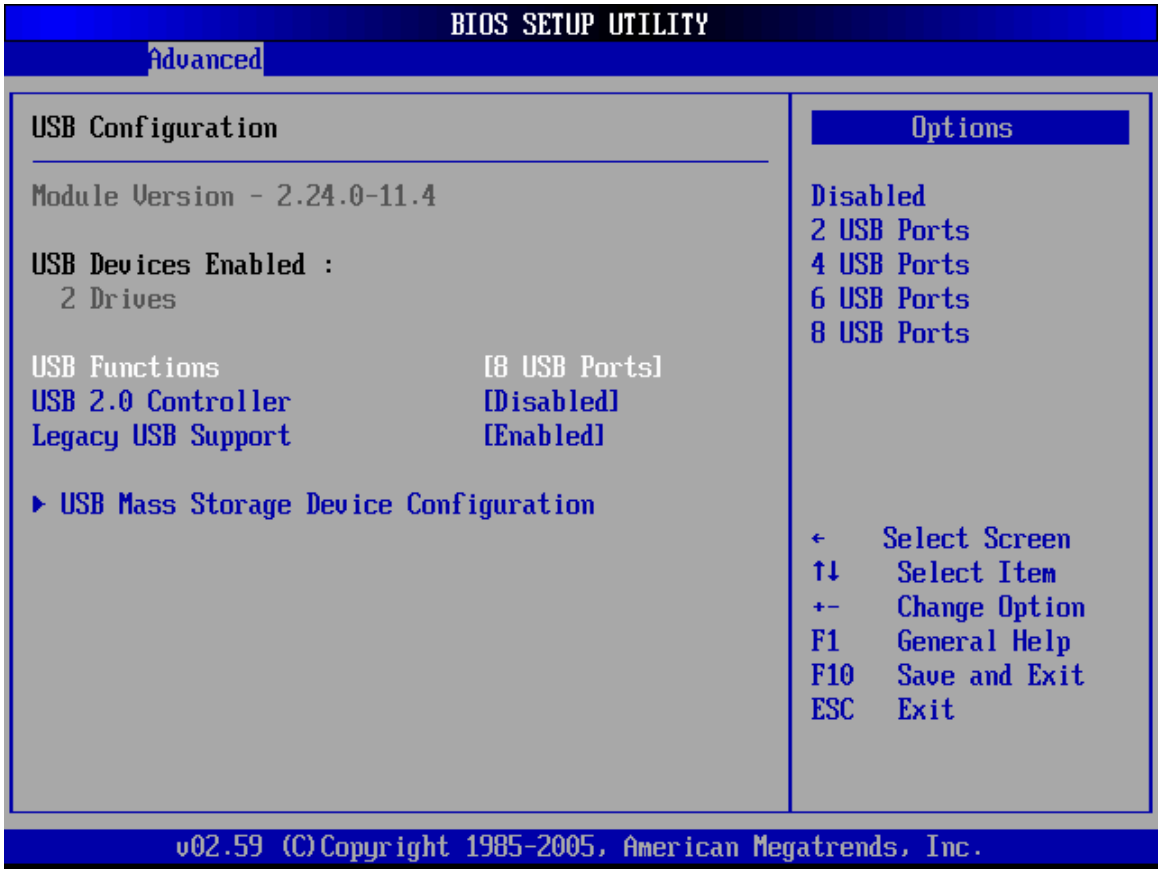
**MPS Revision [1.4]**

Use the **Multiprocessor Specification (MPS) for OS** option to specify the MPS version to be used.

| | | |
|---|---|---|
| 1.1 | | MPS version 1.1 is used |
| 1.4 | Default | MPS version 1.4 is used |

**USB Configuration**

Use the **USB Configuration** menu (**BIOS Menu 12**) to read USB configuration information and configure the USB settings.




**BIOS Menu 12: USB Configuration**

**USB Configuration**

The **USB Configuration** field shows the system USB configuration. The items listed are:

**Module Version: x.xxxxx.xxxxx**

**USB Devices Enabled**

The **USB Devices Enabled** field lists the USB devices that are enabled on the system

**USB Function [8 USB Ports]**

Use the **USB Function** BIOS option to disable USB function support or to set the number of USB ports to activate.

| | | |
|---|---|---|
| Disabled | | USB function support disabled |
| 2 USB Ports | | Two USB ports are activated. |
| 4 USB Ports | | Four USB ports are activated. |
| 6 USB Ports | | Six USB ports are activated. |
| 8 USB Ports | Default | Eight USB ports are activated. |

**USB 2.0 Controller [Enabled]**

Use the **USB 2.0 Controller** BIOS option to enable or disable the USB 2.0 controller

| | | |
|---|---|---|
| Enabled | Default | USB 2.0 controller enabled |
| Disabled | | USB 2.0 controller disabled |

**Legacy USB Support [Enabled]**

Use the **Legacy USB Support** BIOS option to enable USB mouse and USB keyboard support. Normally if this option is not enabled, any attached USB mouse or USB keyboard does not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB driver loaded onto the system.

| | | |
|---|---|---|
| Disabled | | Legacy USB support disabled |
| Enabled | Default | Legacy USB support enabled |
| Auto | | Legacy USB support disabled if no USB devices are connected |

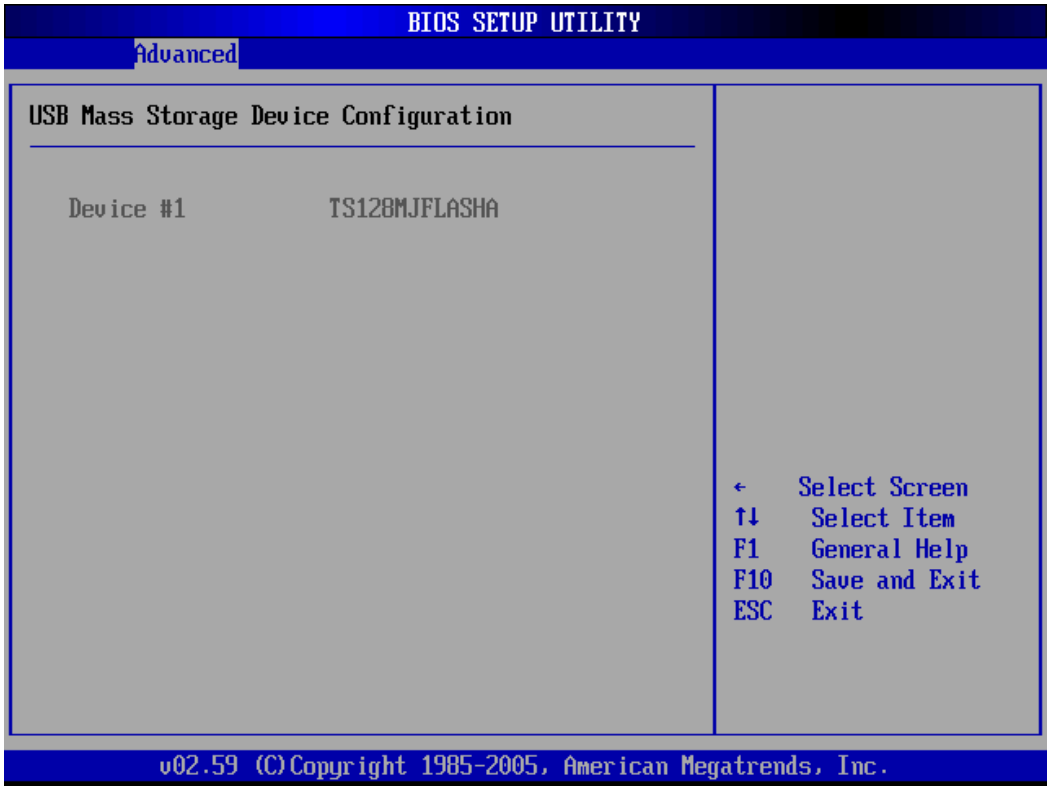
**USB2.0 Controller Mode [FullSpeed]**

Use the **USB2.0 Controller Mode** option to set the speed of the USB2.0 controller.

| | | |
|---|---|---|
| FullSpeed | Default | The controller is capable of operating full speed |

## USB Mass Storage Device Configuration

Use the **USB Mass Storage Device Configuration** menu (**BIOS Menu 14**) to configure USB mass storage class devices.



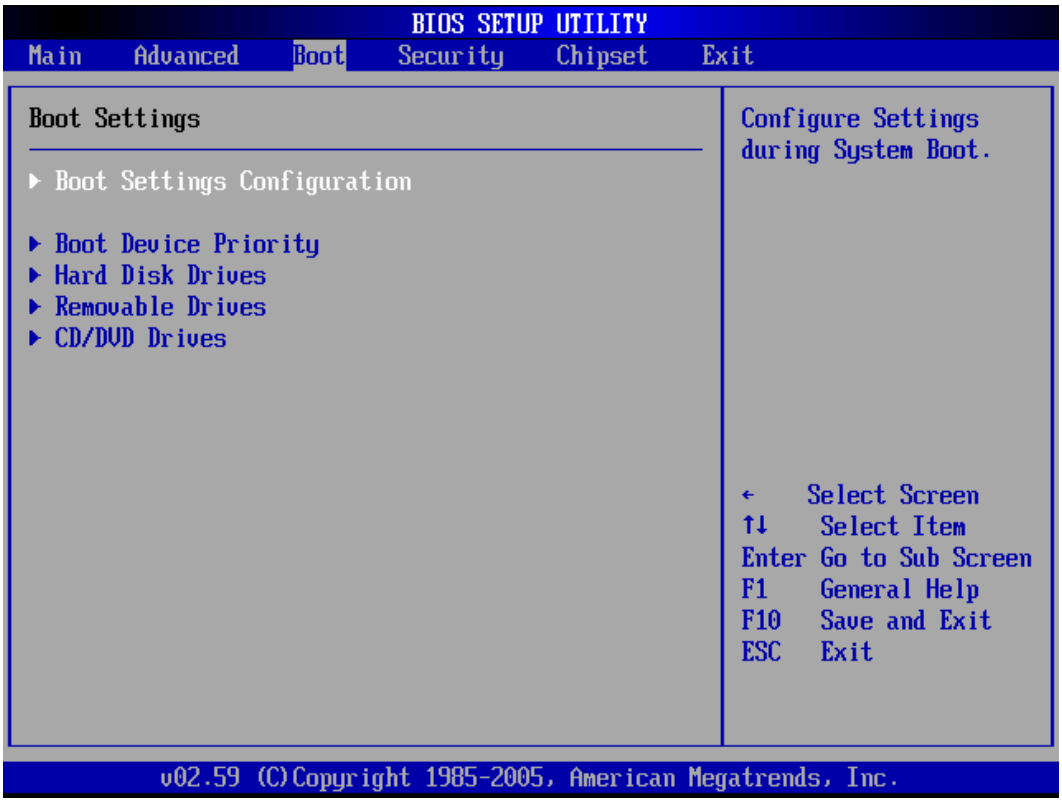

**BIOS Menu 13: USB Mass Storage Device Configuration**

**Device ##**

The **Device##** field lists the USB devices that are connected to the system.

## Boot

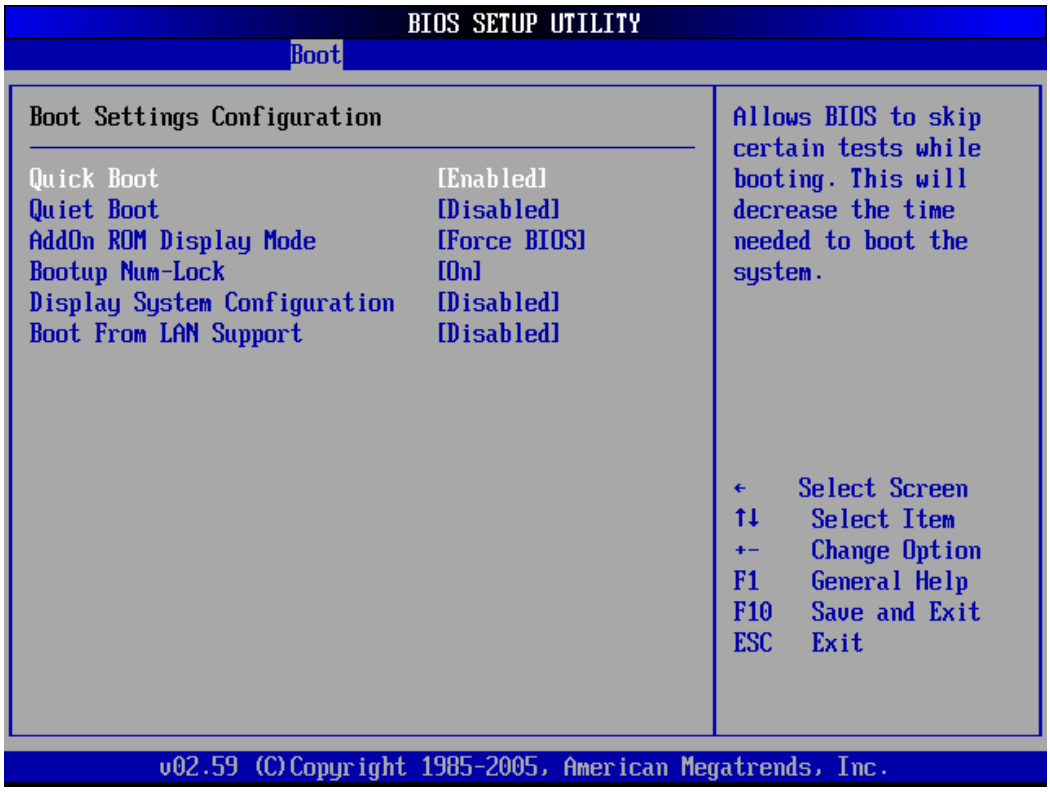
Use the **Boot** menu (**BIOS Menu 14**) to configure system boot options.




**BIOS Menu 14: Boot**

### Boot Settings Configuration

Use the **Boot Settings Configuration** menu (**BIOS Menu 16**) to configure advanced system boot options.


BIOS SETUP UTILITY
Boot
Boot Settings Configuration
Quick Boot [Enabled]
Quiet Boot [Disabled]
AddOn ROM Display Mode [Force BIOS]
Bootup Num-Lock [On]
Display System Configuration [Disabled]
Boot From LAN Support [Disabled]
Allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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**BIOS Menu 15: Boot Settings Configuration**

### Quick Boot [Enabled]

Use the **Quick Boot** BIOS option to make the computer speed up the boot process.

| | | |
|---|---|---|
| Disabled | | No POST procedures are skipped |
| Enabled | Default | Some POST procedures are skipped to decrease the system boot time |

### Quiet Boot [Disabled]

Use the **Quiet Boot** BIOS option to select the screen display when the system boots.

| | | |
|---|---|---|
| Disabled | Default | Normal POST messages displayed |
| Enabled | | OEM Logo displayed instead of POST messages |

### AddOn ROM Display Mode [Force BIOS]

Use the **AddOn ROM Display Mode** option to allow add-on ROM (read-only memory) messages to be displayed.

| | | |
|---|---|---|
| Force BIOS | Default | The system forces third party BIOS to display during system boot. |
| Keep Current | | The system displays normal information during system boot. |

**Bootup Num-Lock [On]**

Use the **Bootup Num-Lock** BIOS option to specify if the number lock setting must be modified during boot up.

| | | |
|---|---|---|
| Off | | Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged. |
| On | Default | Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit. |

**Display System Configuration [Disabled]**

Use the **Display System Configuration** BIOS option to enable or disable the display system configuration.

| | | |
|---|---|---|
| Enabled | Default | The display system configuration is enabled |
| Disabled | | The display system configuration is disabled |

**Boot From LAN Support [Disabled]**

The **BOOT From LAN Support** option enables the system to be booted from a remote system.

| | | |
|---|---|---|
| Disabled | Default | Cannot be booted from a remote system through the LAN |
| Enabled | | Can be booted from a remote system through the LAN |

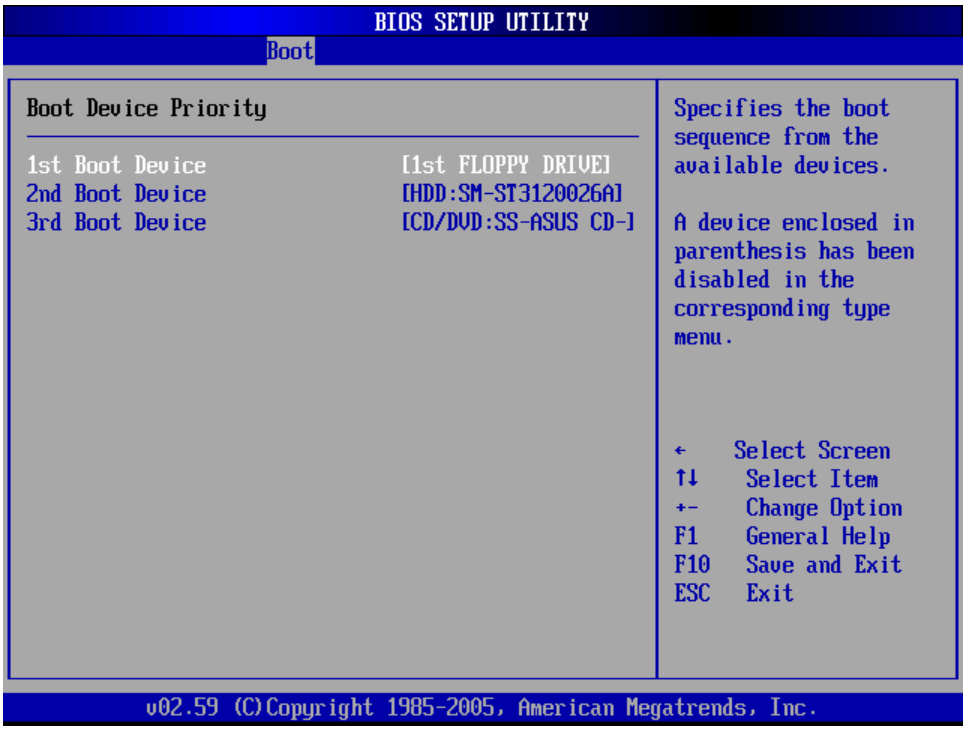
**Boot Device Priority**

Use the **Boot Device Priority** menu (**BIOS Menu 16**) to specify the boot sequence from the available devices. Possible boot devices may include:

**1st FLOPPY DRIVE**

**HDD**

**CD/DVD**


BIOS SETUP UTILITY
Boot
Boot Device Priority
1st Boot Device [1st FLOPPY DRIVE]
2nd Boot Device [HDD:SM-ST3120026A]
3rd Boot Device [CD/DVD:SS-ASUS CD-]
Specifies the boot sequence from the available devices.
A device enclosed in parenthesis has been disabled in the corresponding type menu.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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**BIOS Menu 16: Boot Device Priority Settings**

### Hard Disk Drives

Use the **Hard Disk Drives** menu to specify the boot sequence of the available HDDs. When the menu is opened, the HDDs connected to the system are listed as shown below:

**1st Drive [HDD: PM-(part number)]**

| | |
|---|---|
| | **NOTE:**<br>Only the drives connected to the system are shown. For example, if only two HDDs are connected only “1st Drive” and “2nd Drive” are listed. |

The boot sequence from the available devices is selected. If the “**1st Drive**” option is selected a list of available HDDs is shown. Select the first HDD the system boots from. If the “**1st Drive**” is not used for booting this option may be disabled.

### Removable Drives

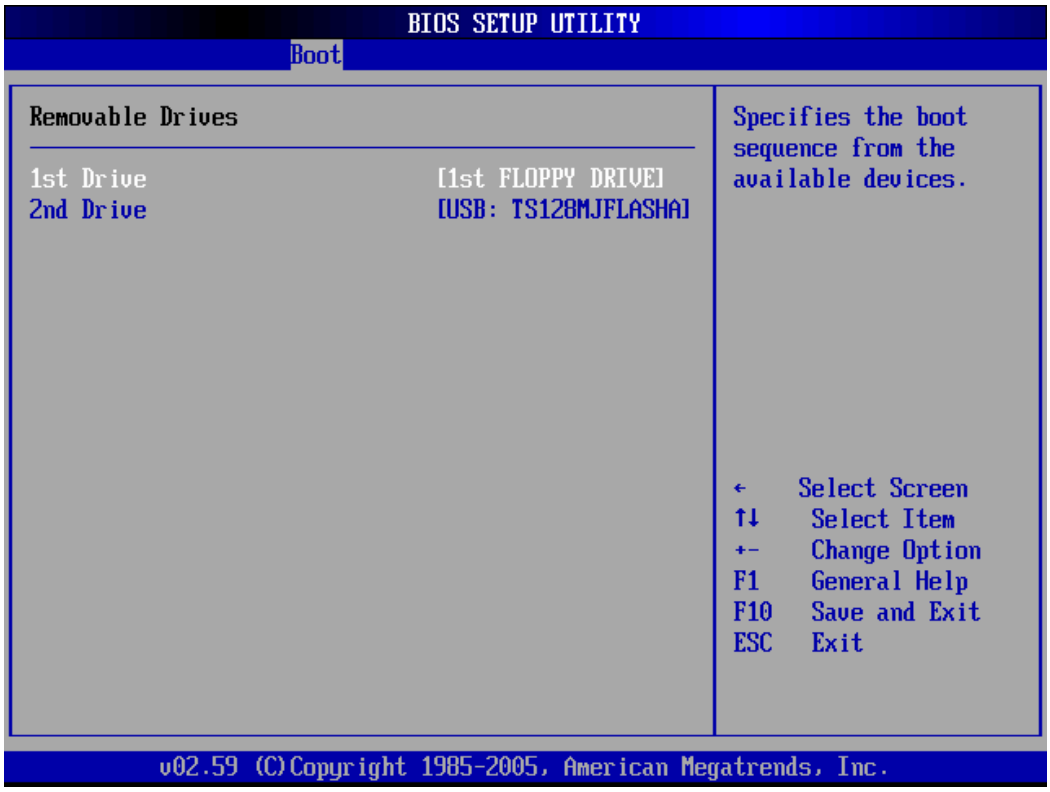
Use the **Removable Drives** menu (**BIOS Menu 17**) to specify the boot sequence of the available FDDs. When the menu is opened, the FDDs connected to the system are listed as shown below:

**1st Drive [1st FLOPPY DRIVE]**

**2nd Drive [2nd FLOPPY DRIVE]**

| | |
|---|---|
| | **NOTE:**<br>Only the drives connected to the system are shown. For example, if only one FDD is connected only “1st Drive” is listed. |

The boot sequence from the available devices is selected. If the “**1st Drive**” option is selected a list of available FDDs is shown. Select the first FDD the system boots from. If the “**1st Drive**” is not used for booting this option may be disabled.




**BIOS Menu 17: Removable Drives**

**CD/DVD Drives**

Use the **CD/DVD Drives** menu to specify the boot sequence of the available CD/DVD drives. When the menu is opened, the CD drives and DVD drives connected to the system are listed as shown below:

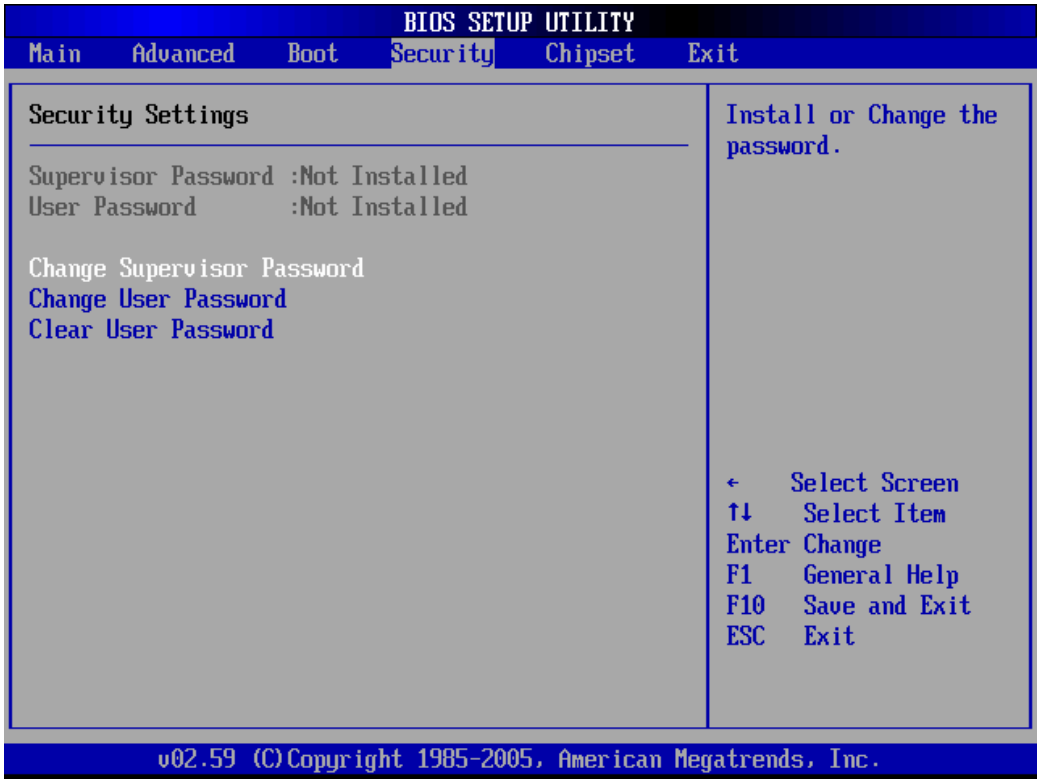
**1st Drive [CD/DVD: PM-(part ID)]**

| | |
|---|---|
| | **NOTE:**<br>Only the drives connected to the system are shown. For example, if only two CDs or DVDs are connected only “1st Drive” and “2nd Drive” are listed. |

The boot sequence from the available devices is selected. If the "**1st Drive**" option is selected a list of available CD/DVD drives is shown. Select the first CD/DVD drive the system boots from. If the "**1st Drive**" is not used for booting this option may be disabled.

## Security

Use the **Security** menu (**BIOS Menu 18**) to set system and user passwords.




**BIOS Menu 18: Security**

### Change Supervisor Password

Use the Change Supervisor Password to set or change a supervisor password. The default for this option is Not Installed. If a supervisor password must be installed, select this field and enter the password. After the password has been added, Install appears next to Change Supervisor Password.

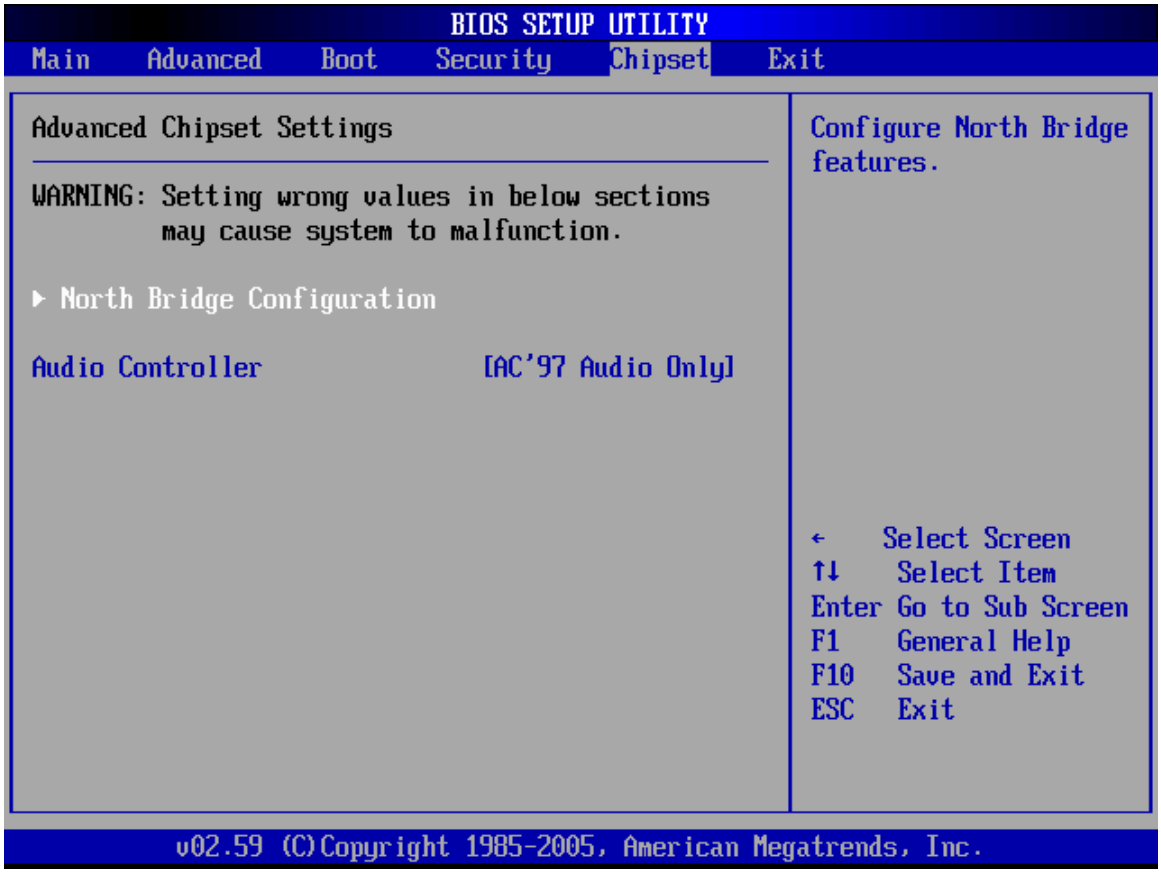
### Change User Password

Use the Change User Password to set or change a user password. The default for this option is Not Installed. If a user password must be installed, select this field and enter the password. After the password has been added, Install appears next to Change User Password.

## Chipset

Use the **Chipset** menu (**BIOS Menu 19**) to access the NorthBridge and SouthBridge configuration menus

| | |
|---|---|
|  | **WARNING!**<br>Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction. |


BIOS SETUP UTILITY
Main Advanced Boot Security Chipset Exit
Advanced Chipset Settings
WARNING: Setting wrong values in below sections may cause system to malfunction.
North Bridge Configuration
Audio Controller [AC'97 Audio Only]
Configure North Bridge features.
← Select Screen
↑↓ Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
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**BIOS Menu 19: Chipset**

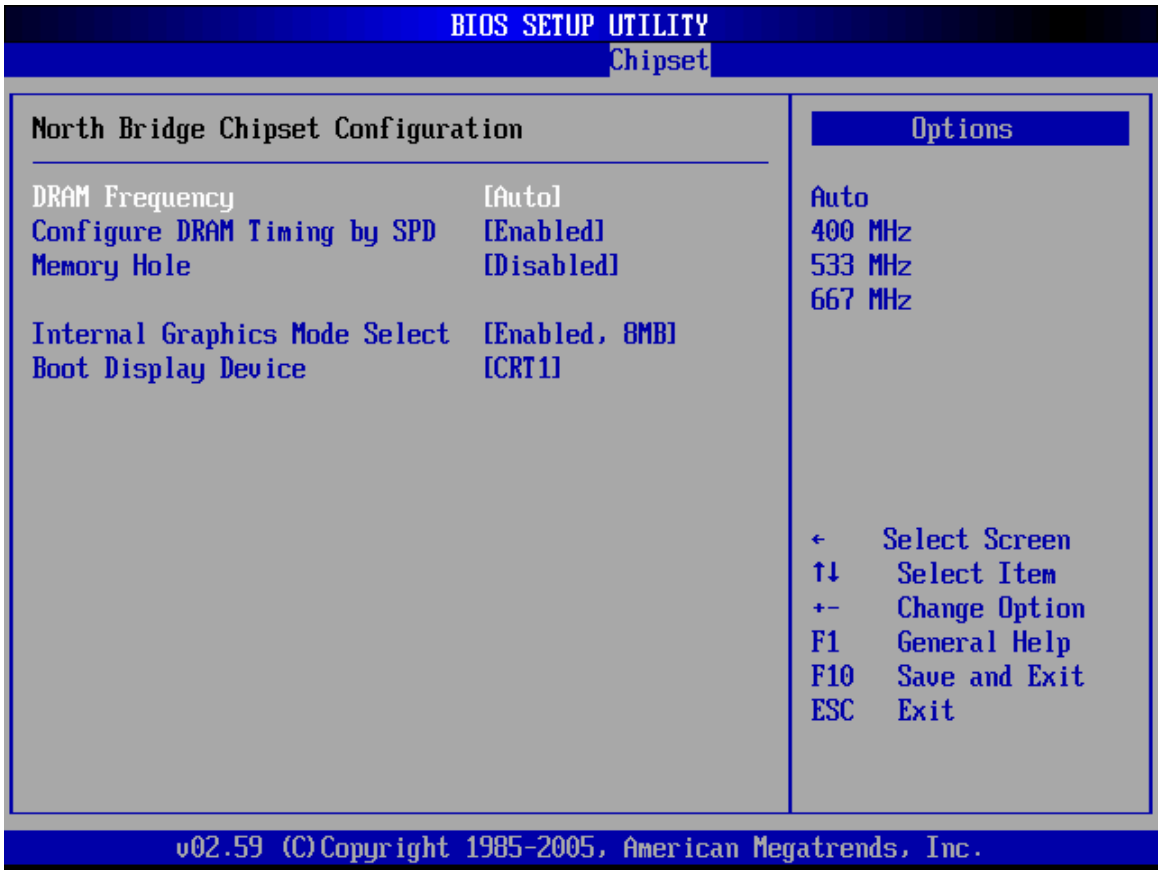
### Audio Controller [AC'97 Audio Only],

Use the **Audio Controller** option to select the audio specification to apply on the system.

| | | |
|---|---|---|
| AC'97 Audio Only | Default | The audio specification is set to AC' 97 CODEC only. |
| All Disabled | | All the audio specifications are disabled. |

## North Bridge Configuration

Use the **NorthBridge Configuration** menu (**BIOS Menu 21**) to configure the northbridge chipset.




**BIOS Menu 20:NorthBridge Chipset Configuration**

### DRAM Frequency [Auto]

Use the **DRAM Frequency** option to specify the DRAM frequency or allow the system to automatically detect the DRAM frequency.

| | | |
|---|---|---|
| Auto | Default | Automatically selects the DRAM frequency |
| 400MHz | | Sets the DRAM frequency to 400MHz |
| 533MHz | | Sets the DRAM frequency to 533MHz |
| 667MHz | | Sets the DRAM frequency to 667MHz |

### Configure DRAM Timing by SPD [Enabled]

Use the **Configure DRAM Timing by SPD** option to determine if the system uses the SPD *(*Serial Presence Detect) EEPROM to configure the DRAM timing. The SPD EEPROM contains all necessary DIMM specifications including the speed of the individual components such as CAS and bank cycle

time as well as valid settings for the module and the manufacturer's code. The SPD enables the BIOS to read the spec sheet of the DIMMs on boot-up and then adjust the memory timing parameters accordingly.

| | | |
|---|---|---|
| Disabled | | DRAM timing parameters are manually set using the DRAM sub-items |
| Enabled | Default | DRAM timing parameter are set according to the DRAM Serial Presence Detect (SPD) |

If the **Configure DRAM Timing by SPD** option is disabled, the following configuration options appear.

DRAM CAS# Latency [3]

DRAM RAS# to CAS# Delay [5 DRAM Clocks]

DRAM RAS# Precharge [5 DRAM Clocks]

DRAM RAS# Activate to Precha [15 DRAM Clocks]

**Memory Hole [Disabled]**

Use the **Memory Hole** option to reserve memory space between 15MB and 16MB for ISA expansion cards that require a specified area of memory to work properly. If an older ISA expansion card is used, please refer to the documentation that came with the card to see if it is necessary to reserve the space.

| | | |
|---|---|---|
| Disabled | Default | Memory is not reserved for ISA expansion cards |
| 15MB – 16MB | | Between 15MB and 16MB of memory is reserved for ISA expansion cards |

**Initate Graphic adaptor [IGD]**

Use the **Initate Graphic adaptor** option to specify first initial graphic adaptor.

| | | |
|---|---|---|
| IGD | Default | Initial on-board VGA first |
| PCI/IGD | | Initial PCI VGA card first |

**Internal Graphics Mode Select [Enable, 8MB]**

Use the **Internal Graphic Mode Select** option to specify the amount of system memory that can be used by the Internal graphics device.

| | | |
|---|---|---|
| Disable | | |
| Enable, 1MB | | 1MB of memory used by internal graphics device |
| Enable, 8MB | Default | 8MB of memory used by internal graphics device |

**Boot display device [CRT1]**

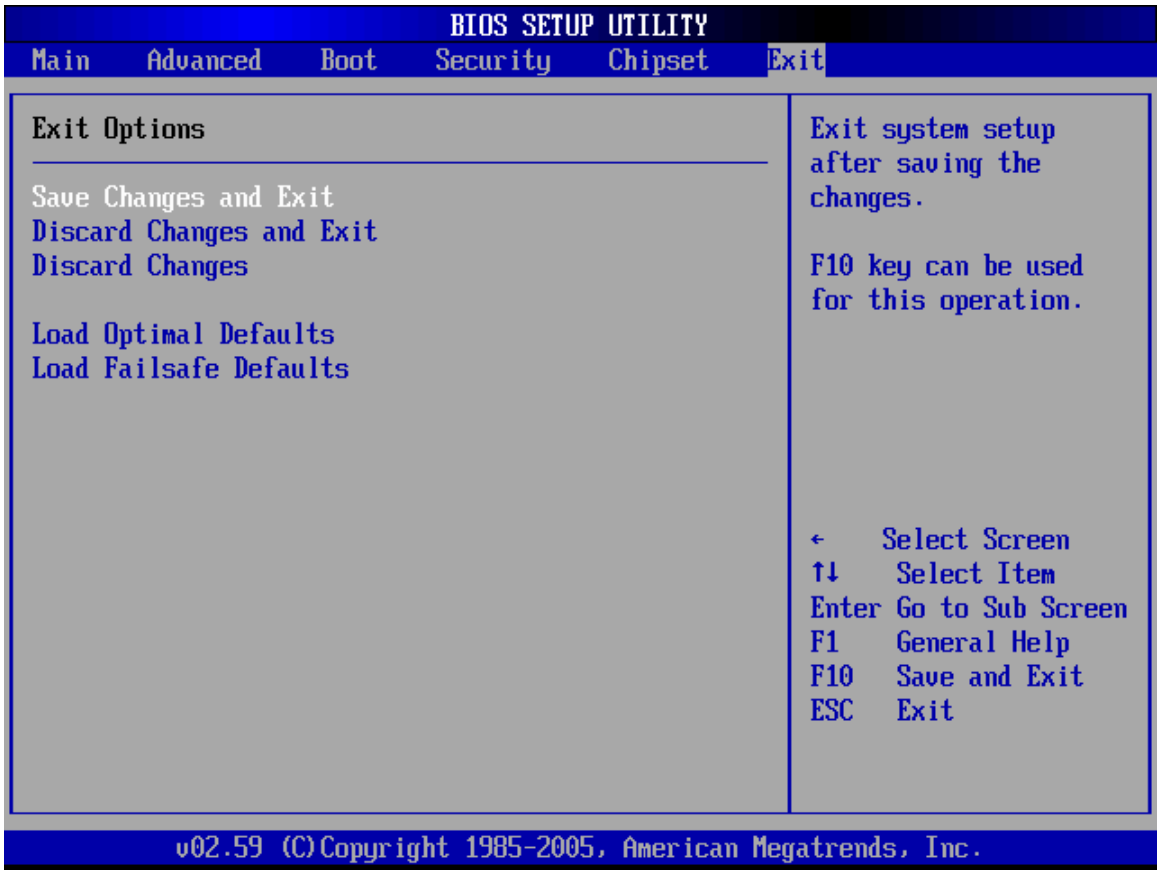
Use the **Boot display device** option to specify boot up monitor

| | | |
|---|---|---|
| CRT1 | Default | Boot up form CRT1 connector |
| CRT1 + CRT2 | | Boot up form both of CRT1 & CRT2 connector |

| | |
|---|---|
| CRT2 | Boot up form CRT1 connector |

## Exit

Use the **Exit** menu (**BIOS Menu 21**) to load default BIOS values, optimal failsafe values and to save configuration changes.


BIOS SETUP UTILITY
Main Advanced Boot Security Chipset Exit
Exit Options
Save Changes and Exit
Discard Changes and Exit
Discard Changes
Load Optimal Defaults
Load Failsafe Defaults
Exit system setup after saving the changes.
F10 key can be used for this operation.
← Select Screen
↑↓ Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
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**BIOS Menu 21:Exit**

### Save Changes and Exit

Use the **Save Changes and Exit** option to save the changes made to the BIOS options and to exit the BIOS configuration setup program.

### Discard Changes and Exit

Use the **Discard Changes and Exit** option to exit the BIOS configuration setup program without saving the changes made to the system.

**Discard Changes**

Use the **Discard Changes** option to discard the changes and remain in the BIOS configuration setup program.

**Load Optimal Defaults**

Use the **Load Optimal Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F9 key can be used for this operation.**

**Load Failsafe Defaults**

Use the **Load Failsafe Defaults** option to load failsafe default values for each of the parameters on the Setup menus. **F8 key can be used for this operation.**

## Jumper Setting

### Clear CMOS Setting

To clear the CMOS Setup (for example if you have forgotten the password, you should clear the CMOS and then re-set the password), you should close the CLR_CMOS1(2-3) for about 3 seconds, then open it once more. This will set back to normal operation mode**.**

CLR_COMS1 : Clear CMOS Setup



| CLR_COMS1 | DESCRIPTION |
|---|---|
| 1-2 (default)* | Keep CMOS Setup (Normal operation) |
| 2-3 | Clear CMOS Setup |

COM1 Port RI and Voltage Selection



| J_COM_F1 | DESCRIPTION |
|---|---|
| 2-3 | COM1 RI Pin Use RI |
| 1-2 | COM1 RI Pin Use Voltage |



| J_COM_V1 | DESCRIPTION |
|---|---|
| 2-3 | COM1 RI Pin Use Voltage 12V |
| 1-2 | COM1 RI Pin Use Voltage 5V |

### COM port Setting

COM2 Port RI and Voltage Selection



| J_COM_F2 | DESCRIPTION |
|---|---|
| 2-3 | COM2 RI Pin Use RI |
| 1-2 | COM2 RI Pin Use Voltage |



| J_COM_V2 | DESCRIPTION |
|---|---|
| 2-3 | COM2 RI Pin Use Voltage 12V |
| 1-2 | COM2 RI Pin Use Voltage 5V |

COM3 Port RI and Voltage Selection



| J_COM_F3 | DESCRIPTION |
|---|---|
| 2-3 | COM3 RI Pin Use RI |
| 1-2 | COM3 RI Pin Use Voltage |



| J_COM_V3 | DESCRIPTION |
|---|---|
| 2-3 | COM3 RI Pin Use Voltage 12V |
| 1-2 | COM3 RI Pin Use Voltage 5V |

**COM port Setting**

COM4 Port RI and Voltage Selection

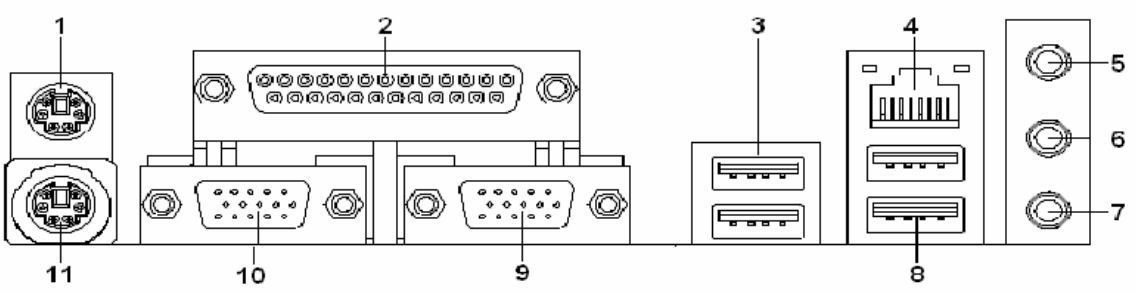


| J_COM_F4 | DESCRIPTION |
|---|---|
| 2-3 | COM4 RI Pin Use RI |
| 1-2 | COM4 RI Pin Use Voltage |



| J_COM_V4 | DESCRIPTION |
|---|---|
| 2-3 | COM4 RI Pin Use Voltage 12V |
| 1-2 | COM4 RI Pin Use Voltage 5V |

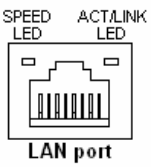
Connectors




1. **PS/2 mouse port.** This port is for a PS/2 mouse.
2. **Parallel port.** This 25-pin port connects a parallel printer, a scanner, or other devices
3. **USB 2.0 ports 3 and 4.** These two 4-pin Universal Serial Bus (USB) ports are available for connecting USB 2.0 devices.
4. **LAN (RJ-45) port.** This port allows Gigabit connection to Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indication.

**LAN port LED indications**

| SPEED LED | | ACT/LINK LED | |
|---|---|---|---|
| **Status** | **Description** | **Status** | **Description** |
| OFF | 10 Mbps connection | OFF | No link |
| ORANGE | 100 Mbps connection | YELLOW | Linked |
| GREEN | 1 Gbps connection | BLINKING | Date activity |



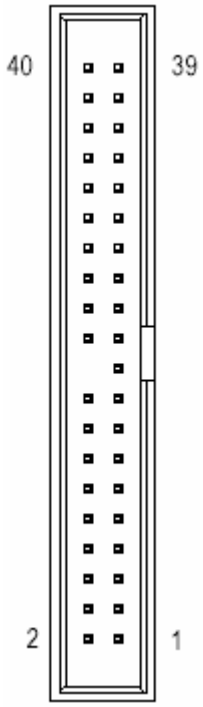

5. **Line In port.** This port connects a CD ,DVD player, or other audio devices.
6. **Line Out port.** This port connects a headphone or a speaker. In 4,6,8-channel configuration, the function of this port becomes Front Speaker Out.
7. **Microphone port.** This port connects a microphone.
8. **USB 2.0 ports 1 and 2.** These two 4-pin Universal Serial Bus (USB) ports are available for connecting USB 2.0 devices.
9. **VGA2 port** . This 15-pin Secondary VGA port connects to a VGA monitor.
10. **VGA1 port** . This 15-pin Primary VGA port connects to a VGA monitor.
11. **PS/2 Keyboard port.** This port is for PS/2 keyboard.

**PCI E-IDE Disk Drive Connector**

One IDE connector can connect to one IDE cable, and the single IDE cable can then connect to two IDE devices.

- IDE : IDE1 Connector .

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | RESET# | 2 | GND |
| 3 | DATA 7 | 4 | DATA 8 |
| 5 | DATA 6 | 6 | DATA 9 |
| 7 | DATA 5 | 8 | DATA 10 |
| 9 | DATA 4 | 10 | DATA 11 |
| 11 | DATA 3 | 12 | DATA 12 |
| 13 | DATA 2 | 14 | DATA 13 |
| 15 | DATA 1 | 16 | DATA 14 |
| 17 | DATA 0 | 18 | DATA 15 |
| 19 | GND | 20 | (KEY) |
| 21 | DRQ | 22 | GND |
| 23 | IOW# | 24 | GND |
| 25 | IOR# | 26 | GND |
| 27 | CHRDY | 28 | GND |
| 29 | DACK | 30 | GND |
| 31 | INTERRUPT | 32 | N/C |
| 33 | SA1 | 34 | P66DET |
| 35 | SA0 | 36 | SA2 |
| 37 | HDC CS0# | 38 | HDC CS1# |
| 39 | HDD ACTIVE# | 40 | GND |

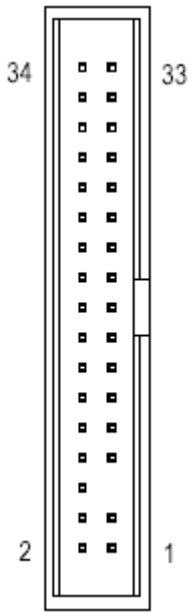


### Floppy Connector

The FDD1 connector is used to connect the FDD cable while the other end of the cable connects to the FDC drive. The types of FDD drives FDC drivers supported are:360KB, 720KB, 1.2MB, 1.44MB and 2.88MB. Please connect the red power connector wire to the pin1 position.

- FDc1 : Floppy Connector .

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | GND | 2 | RWC0- |
| 3 | GND | 4 | NC |
| 5 | NC | 6 | NC |
| 7 | GND | 8 | INDEX- |
| 9 | GND | 10 | MO-A |
| 11 | GND | 12 | DS-B |
| 13 | GND | 14 | DS-A |
| 15 | GND | 16 | MO-B |
| 17 | GND | 18 | DIR- |
| 19 | GND | 20 | STEP- |
| 21 | GND | 22 | WD- |
| 23 | GND | 24 | WGATE- |
| 25 | GND | 26 | TRK0- |
| 27 | GND | 28 | WP- |
| 29 | GND | 30 | RDATA- |
| 31 | GND | 32 | HEAD- |
| 33 | GND | 34 | DSKCHG- |




### Serial Port connector

The Board offers Six high speed NS16C550 compatible UART's with 16-byte Read/Receive FIFO serial ports.

- COM1,2 : 10-Pin Serial Port Connector.

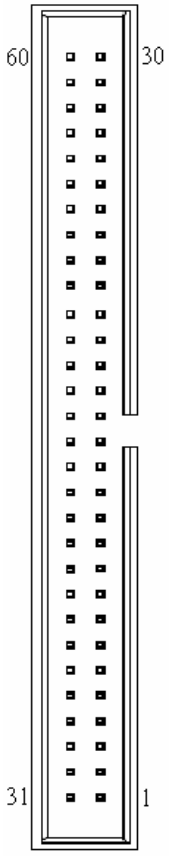
| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | DCD | 2 | DSR |
| 3 | RXD | 4 | RTS |
| 5 | TXD | 6 | CTS |
| 7 | DTR | 8 | RI/Vlotage |
| 9 | GND | 10 | NC |



-

JCOM345678 : 60-Pin Serial Port Connector.

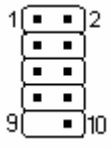
| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | DCD3 | 31 | DSR3 |
| 2 | RXD3 | 32 | RTS3 |
| 3 | TXD3 | 33 | CTS3 |
| 4 | DTR3 | 34 | RI3/Vlotage |
| 5 | GND | 35 | NC |
| 6 | DCD4 | 36 | DSR4 |
| 7 | RXD4 | 37 | RTS4 |
| 8 | TXD4 | 38 | CTS4 |
| 9 | DTR4 | 49 | RI4/Vlotage |
| 10 | GND | 40 | NC |
| 11 | DCD5 | 41 | DSR5 |
| 12 | RXD5 | 42 | RTS5 |
| 13 | TXD5 | 43 | CTS5 |
| 14 | DTR5 | 44 | RI5 |
| 15 | GND6 | 45 | NC |
| 16 | DCD6 | 46 | DSR6 |
| 17 | RXD6 | 47 | RTS6 |
| 18 | TXD6 | 48 | CTS6 |
| 19 | DTR6 | 49 | RI6 |
| 20 | GND | 50 | NC |
| 21 | DCD7 | 51 | DSR7 |
| 22 | RXD7 | 52 | RTS7 |
| 23 | TXD7 | 53 | CTS7 |
| 24 | DTR7 | 54 | RI7 |
| 25 | GND | 55 | NC |
| 26 | DCD8 | 56 | DSR8 |
| 27 | RXD8 | 57 | RTS8 |
| 28 | TXD8 | 58 | CTS8 |
| 29 | DTR8 | 59 | RI8 |
| 30 | GND | 60 | NC |




**USB Port Connector**

- USB2,3 : 2 ports USB Connector.

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | VCC | 2 | VCC |
| 3 | DATA0- | 4 | DATA1- |
| 5 | DATA0+ | 6 | DATA1+ |
| 7 | GND | 8 | GND |
| 9 | KEY | 10 | NC |

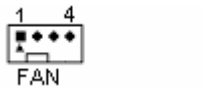


**Fan Connector**

The IOBP-945G-SEL also has a CPU with cooling fan connector and chassis fan connector, which can supply 12V to the cooling fan. There is a “sense” pin in the fan connector, which transfers the fan’s sense signal to the system BIOS in order to recognize the fan speed. Please note that only some specific types of fans offer a rotation signal.

- CPU_FAN1 : Fan Connector.

| PIN | DESCRIPTION |
|---|---|
| 1 | GND |
| 2 | +12V |
| 3 | Sense |
| 4 | Speed control |




- SYS_FAN1 : Fan Connector.

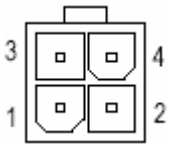
| PIN | DESCRIPTION |
|---|---|
| 1 | GND |
| 2 | +12V |
| 3 | Sense |

**CPU Power Connector**

The CPU12V1 power connector main supplies power to the CPU. If the CPU12V1 power connector is not connected, the system will not start.

- CPU12V1 : CPU Power Connector.

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | GND | 2 | GND |
| 3 | +12V | 4 | +12V |

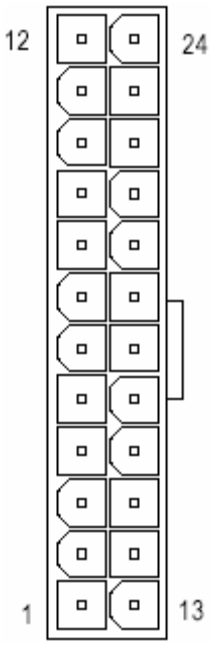


**Power Connector**

With the use of the power connector, the power supply can enough stable power all the components on the motherboard. Before connecting the power connector, please make sure that all components are properly installed.

- PWR1 : Power Connector.

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | 3.3V | 13 | 3.3V |
| 2 | 3.3V | 14 | -12V |
| 3 | GND | 15 | GND |
| 4 | +5V | 16 | PS_ON |
| 5 | GND | 17 | GND |
| 6 | +5V | 18 | GND |
| 7 | GND | 19 | GND |
| 8 | Power good | 20 | -5V |
| 9 | 5VSB | 21 | +5V |
| 10 | +12V | 22 | +5V |
| 11 | +12V | 23 | +5V |
| 12 | 3.3V | 24 | GND |

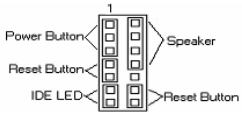



**Front Panel Jumper**

Please connect the power LED, PC speaker, reset switch and power switch etc of your chassis front panel to the CN1 connector according to the pin assignment below.

- CN1: Front Panel Jumper

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | Power LED+ | 2 | Speaker+ |
| 3 | NC | 4 | NC |
| 5 | Power LED- | 6 | NC |
| 7 | Power Button+ | 8 | Speaker- |
| 9 | Power Button- | 10 | NC |
| 11 | IDE LED+ | 12 | Reset Button+ |
| 13 | IDE LED- | 14 | Reset Button- |

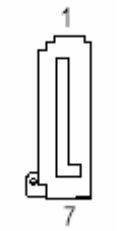


**Serial ATA Connector**

This connectors are for the Serial ATA signal cable for Serial ATA hard disk drives.

- SATA1, 2, : Serial ATA Connector.

| PIN | DESCRIPTION |
|---|---|
| 1 | GND |
| 2 | TXP |
| 3 | TXN |
| 4 | GND |
| 5 | RXN |
| 6 | RXP |
| 7 | GND |



### 6.3.2 HDD

#### FEATURES

• Max. 160GB Formatted Capacity Per Disk
• Serial ATA 3.0Gbps Interface Support
• SATA Native Command Queuing Feature set
• On-the-fly(OTF) error correction
• Supports all logical geometries as programmed by the host
• Fluid Bearing Spindle Motor Technology
• Noise predictive PRML read channel
• Dynamic anti-stiction algorithm
• ATA S.M.A.R.T. Compliant
• ATA Automatic Acoustic Management Feature Set
• ATA 48-bit Address Feature Set
• ATA Streaming Feature Set(Optional)
• ATA Device Configuration Overlay Feature Set
• NoiseGuard™
• SilentSeek™

#### DRIVE CONFIGURATION

Interface Serial ATA : 3.0Gbps
Buffer DRAM Size : 2 / 8 MB
Bytes per Sector : 512

#### PERFORMANCE SPECIFICATIONS

Read Seek Time (typ.)
Track to Track : 0.8 ms
Average : 8.9 ms
Full Stroke : 18 ms
Average Latency : 4.17 ms
Rotational Speed : 7,200 RPM
Data Transfer Rate

Media to/from Buffer (max.) : 300 MB/sec
Buffer to/from Host (max.) : 967 Mbits/sec
Drive Ready Time (typ.) : 8 sec

**RELIABILITY SPECIFICATIONS**

Non-recoverable Read Error : 1 sector in $10P^{14}$ bits
MTBF : 600,000 POH
Start/Stop Cycles (Ambient) : 50,000
Component Design Life : 5 years

**ACOUSTICS (AVERAGE SOUND POWER)**

Idle : 2.45 Bel
Performance Seek : 2.80 Bel
Quiet Seek : 2.75 Bel

**PHYSICAL DIMENSION**

Height : 1 in
Width : 4 in
Depth : 5.75 in
Weight 40/80GB 0.99
120/160GB 1.02

Note)
1) Specifications are subject to change without notice.
2) 1MB=1,000,000 Bytes, 1GB=1,000,000,000 Bytes.
Accessible capacity may vary depending on operating environment and formatting
3) 7,200 RPM class. Actual speed can be different a little.
4) Averaged value with a high performance cover.
5) Random seek with 30% duty cycle.
6) Power consumption with/without slumber mode.

### 6.3.3 ODD

**General specifications**

(1) Interface : P-ATA
(2) Disc Diameter : 8cm/ 12cm
(3) Loading Type : Motorized Tray
(4) Drive Mounting : Horizontal / Vertical
(5) Physical Spec : 148.2mm(W) x170mm(D) x42mm(H)
(6) Buffer Under Run : Buffer Under Run Free Technology used
(7) Buffer Size : 2MB
(8) Power Consumption : DC+5V / 1A, DC +12V / 1.5A

**Performance**

**(1) Burst Transfer Rate**:
PIO Mode 4 Max 16.6MB/sec
UDMA 4 Max 66.6 MB/sec

**(2) Sustain Transfer Rate**:
CD-ROM Max 7.2 MB/sec (48X)
CD-R Read (Mode1) Max 6MB/sec (40x)
CD-RW Read (Mode1) Max 6MB/sec (40x)
DVD-Single ReadMax 21.6MB/sec (16X)
DVD-Dual ReadMax 16.2MB/sec (12X)
DVD-RAM ReadMax 16.2MB/sec (12X)

**(3) Read Speed**:
CD-DA (Audio Play) CAV 16X (Max) Analog/Digital audio Playback
Stamped CD-DA (DAE) CAV 40X
Stamped CD-ROMCAV48X(Max)
CD-RCAV 40X (Max)
CD-RWCAV 40X (Max)
Mixed CD (Data, Audio) CAV 40X (Max)
Enhanced CD (Data, Audio) CAV 40X (Max)
Photo-CD/Extra-CD CAV 40X (Max)
Video-CDCAV 16X (Max)

DVD-Video Play (Single) CAV 6X (Max)
DVD-Video Play (Dual) CAV 6X (Max)
DVD-Single CAV 16X (Max)
DVD-Dual CAV 12X (Max)
DVD±R CAV 16X (Max)
DVD±RW ReadCAV12X (Max)
DVD-RAM ReadCAV12X (Max)
DVD±R DL CAV 12X (Max)
TOC Read (CD/DVD) CLV 4X / CLV 2X
Pause (CD/DVD)CLV 8X / CAV 6X

**(4) Unbalance**:
0.3 gcmCAV 48X (CD), CAV 16X (DVD)
0.5gcm CAV 24X (CD), CAV 6X (DVD)
0.75gcm CAV 24X (CD), CAV 6X (DVD)
1.0gcm CAV 16X (CD), CAV 6X (DVD)

**(5) Eccentricity**
70um(50um) CAV 48X (CD)
140um(100um) CAV 24X (CD), CAV 6X (DVD)
Over 210um CAV 16X (CD), CAV 6X (DVD)

**(6) Write Speed**:
CD-R Max 48X (CAV) Max 7.2MB/sec
CD-RW Max 32X (CAV) Ultra Speed CD-RW Disc
DVD±R Max 20X (CAV) Max 27MB/sec
DVD+RW Max 8X (Z-CLV) Max 10.8MB/sec
DVD-RW Max 6X (CLV) Max 8.1MB/sec
DVD-RAM Max 12X (CAV) Max 16.2MB/sec
DVD±R DL Max 12X (Z-CLV) Max 16.2MB/sec

**(7) CPU Utilization**:
CD & DVD (PIO Mode 4) 85% (Max) Typically Stamped CD/DVD Disc

**(8) Spin Up Time**:
From Spindle Stop to Max Speed (CD/DVD) : 7sec(Typ) Stamped CD/DVDLead-in (1session) (CD/DVD) : 15sec (Typ) Stamped CD/DVD

**(9) Spin Down Time**:
From Max Speed to Spindle Stop (CD/DVD) : 5.5 sec (Typ) Spin Down & Eject (CD/DVD) : 7sec (Typ)

**(10) Access Time**:
1/3 Stroke
CD/R/RW 130ms (STD-200 Disc)
DVD Single 150ms (TDV-520/STD-NH)
DVD Dual/±R DL 180ms (STD-1100)
DVD±R/±RW 160ms (TDV-520/STD-NH)
DVD-RAM 230ms (Full Write Media)

Random
CD/R/RW 130ms (STD-200 Disc)
DVD Single 150ms (TDV-520/STD-NH)
DVD Dual/±R DL 180ms (STD-1100)
DVD±R/±RW 160ms (TDV-520/STD-NH)
DVD-RAM 230ms (Full Write Media)

Full Stroke
CD/R/RW 210ms (STD-200 Disc)
DVD Single 230ms (TDV-520/STD-NH)
DVD Dual/±R DL 250ms (STD-1100)
DVD±R/±RW 250ms (TDV-520/STD-NH)
DVD-RAM 300ms (Full Write Media)

**(11) Lead-in Time**:
CD Stamp, CD-DA Max 17sec STD-200 Disc
CD-R/RW Max 20sec STD-200 Copy
DVD-Single Max 18sec TDV-520/STD-NH
DVD-Dual Max 18sec STD-1100
DVD±R Max 25sec TDV-520/ STD-NH
DVD±RW Max 25sec TDV-520/ STD-NH
DVD±R DL Max 32sec
DVD RAM Max 45sec

## 6.4 ECS EG31M

### 6.4.1 G31 Main Board

It is an industrial mainboard using Intel G31 chipset(north bridge) + ICH7 chipset(south bridge), acting as the main processor of ATM system CE module. Various units are controlled as they interact with each other over such interfaces as USB, Serial, LAN, VGA, DVI, PCI, IDE, SATA..




Fig.6.2 External Appearance

### 6.4.1.1 Functional Description

### Specifications

| | |
|---|---|
| **Overview** | |
| **TG Model Name** | Memphis |
| **Vendor & Model** | ECS EG31M V1.0 |
| **System BIOS** | AMI BIOS with 8Mbit SPI ROM |
| **PCB Dimension** | mATX type, 244mm x 244mm, 4 layers |
| **CPU & Chipset** | |
| **Processor** | Intel LGA 775 Socket, FSB 800/1066/1333MHz |
| **Processor Families** | Intel Celeron 4xx / Pentium Dual Core E2xxx / Core2 Duo / Core2 Quad CPUs |
| **Integrated Graphics** | Intel GMA 3100 |
| **Memory** | DDR2 667/800MHz, 4G Max |
| **DIMM Socket** | 1.8V 240Pin DIMM Socket x 2ea (Dual Channel) |
| **North Bridge** | Intel G31 (A2 stepping, w/ heat sink) |
| **South Bridge** | Intel ICH7 (A1 stepping, w/o heat sink) |
| **Super I/O** | ITE 8718F-S |
| **LAN** | Realtek RTL8111B, 10/100/1000Mbps |
| **Audio** | Realtek ALC888S, 8ch |
| **PWM IC** | ISL 6312CRZ |
| **Add-in Slot** | |
| | 1 PCI Express x16, 1 PCI Express x1, 2 PCI |
| **Rear Panel I/O** | |
| | 4 USB ports, 2 PS/2 ports, 1 Parallel port, 1 Serial port, 1 D-sub connector, 6 Audio ports, 1 RJ-45 connector |
| **Internal Header** | |
| | 1 ATX power supply connector (2x12, White)<br>1 12V connector (2x2, White)<br>1 Floppy connector (White)<br>1 IDE connector (Blue, Ultra DMA-33/66/100/133)<br>4 S-ATA connector (S-ATA1&2)<br>1 Chassis main panel header (2x5, Black)<br>2 Front panel USB header (2x5, White)<br>1 Front panel AUDIO header (2x5, Green)<br>1 Front panel HD audio header (2x8, Black)<br>1 S/PDIF Audio Front panel header (1x4, Black)<br>1 CD_IN header (1x4, Black)<br>1 serial port header (2x5, Green)<br>1 CIR header (2x5, White)<br>1 CMOS clear header (1x3, Red)<br>1 CPU FAN connector (1x4, w/ control)<br>1 System FAN connector (1x3, w/ control) |

## Block Diagram

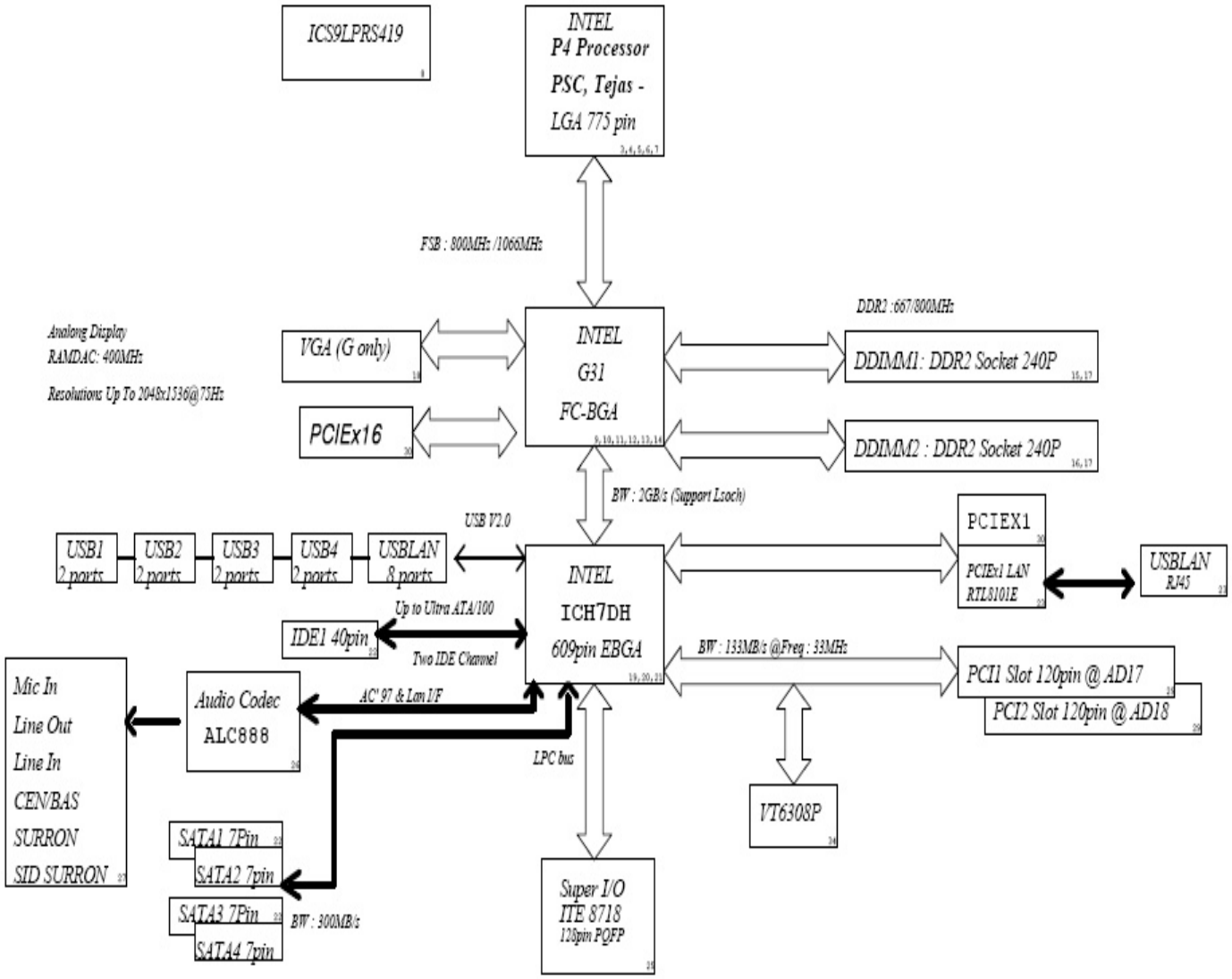
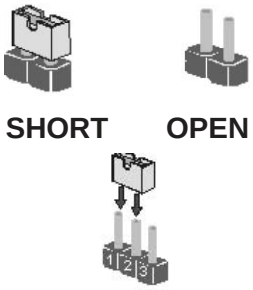



Fig. 6.3

### 6.4.1.2 Jumper setting

This section explains how to set jumpers for correct configuration of the motherboard.




**Setting Jumpers**

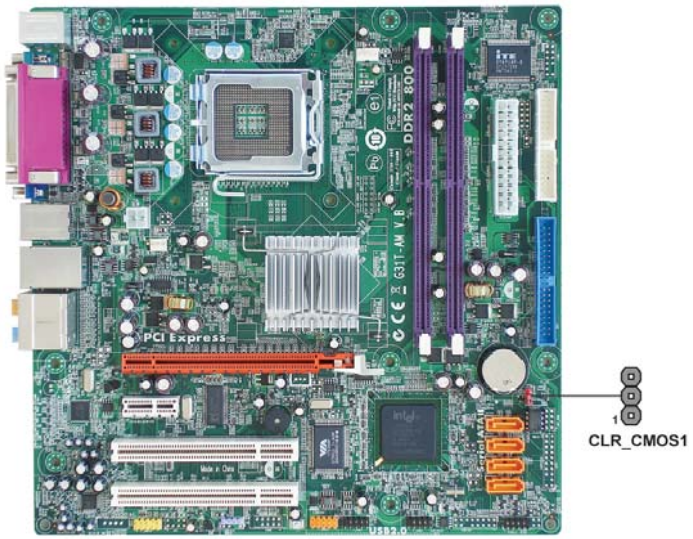
Use the motherboard jumpers to set system configuration options.
Jumpers with more than one pin are numbered.
When setting the jumpers, ensure that the jumper caps are placed on the correct pins.

The illustrations show a 2-pin jumper. When the jumper cap is placed on both pins, the jumper is SHORT. If you remove the jumper cap, or place the jumper cap on just one pin, the jumper is OPEN.

This illustration shows a 3-pin jumper. Pins 1 and 2 are SHORT.

**Checking Jumper Setting**

The following illustration shows the location of the motherboard jumpers. Pin 1 is labeled.




**Jumper Settings**

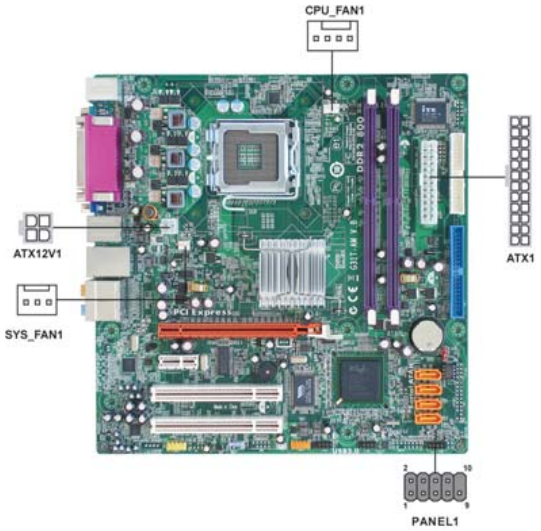
| Jumper | Type | Description | Setting (default) |
|---|---|---|---|
| CLR_CMOS1 | 3-pin | Clear CMOS | 1-2: NORMAL<br>2-3: CLEAR<br><br>CMOS Before clearing the CMOS, make sure to turn off the system. |

### 6.4.1.3 Connecting Component

**Connecting Case Component**

After you have installed the motherboard into a case, you can begin connecting the motherboard components. Refer to the following

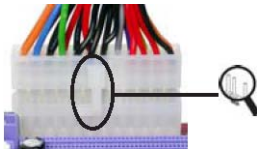
1 Connect the CPU cooling fan cable to **CPU_FAN1**. 2 Connect the system cooling fan connector to **SYS_FAN1**. 3 Connect the case switches and indicator LEDs to the **PANEL1**. 4 Connect the standard power supply connector to **ATX1**. 5 Connect the auxiliary case power supply connector to **ATX12V1**.




Users please note that the 20-pin and 24-pin power cables can both be connected to the ATX1 connector. With the 20-pin power cable, just align the 20-pin power cable with the pin 1 of the ATX1 connector. However, using 20-pin power cable may cause the system to become unbootable or unstable because of insufficient electricity. A minimum power of 300W is recommended for a fully-configured system.



With ATX v1.x power supply, users please note that when installing 20-pin power cable, the latche of power cable falls on the left side of the ATX1 connector latch, just as the picture shows.



With ATX v2.x power supply, users please note that when installing 24-pin power cable, the latches of power cable and the ATX1 match perfectly.

### CPU_FAN1: FAN Power Connector

| Pin | Signal Name | Function |
|---|---|---|
| 1 | G ND | System Ground |
| 2 | +12V | Power +12V |
| 3 | Sense | Sensor |
| 4 | Control | CPU FAN control |

### SYS_FAN1: System Cooling FAN Power Connector

| Pin | Signal Name | Function |
|---|---|---|
| 1 | GND | System Ground |
| 2 | +12V | Power +12V |
| 3 | Sense | Sensor |

### ATX1: ATX 24-pin Power Connector

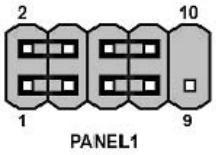
| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | | 13 | System Ground |
| 2 | +3.3V | 14 | -12V |
| 3 | Ground | 15 | Ground |
| 4 | +5V | 16 | PS_ON |
| 5 | Ground | 17 | Ground |
| 6 | +5V | 18 | Ground |
| 7 | Ground | 19 | Ground |
| 8 | PWRGD | 20 | -5V |
| 9 | +5VSB | 21 | +5V |
| 10 | +12V | 22 | +5V |
| 11 | +12V | 23 | +5V |
| 12 | +3.3V | 24 | Ground |

### ATX12V1: ATX 12V Power Connector

| Pin | Signal Name |
|---|---|
| 1 | Ground |
| 2 | Ground |
| 3 | +12V |
| 4 | +12V |

**Front Panel Header**

The front panel header (PANEL1) provides a standard set of switch and LED headers commonly found on ATX or Micro ATX cases. Refer to the table below for information:




| Pin | Signal | Function | Pin | Signal | Function |
|---|---|---|---|---|---|
| 1 | HD_LED_P | Hard disk LED(+) | 2 | FP PWR/SLP | *MSG LED(+) |
| 3 | HD_LED_N | Hard disk LED(-) | 4 | FP PWR/SLP | *MSG LED(-) |
| 5 | RST_SW_N | Reset Switch(-) | 6 | PWR_SW_P | Power Switch(+) |
| 7 | RST_SW_P | Reset Switch(+) | 8 | PWR_SW_N | Power Switch(-) |
| 9 | RSVD | Reserved | 10 | Key | No pin |

**Hard Drive Activity LED**

Connecting pins 1 and 3 to a front panel mounted LED provides visual indication that data is being read from or written to the hard drive. For the LED to function properly, an IDE drive should be connected to the onboard IDE interface. The LED will also show activity for devices connected to the SCSI (hard drive activity LED) connector.

**Power/Sleep/Message waiting LED**

Connecting pins 2 and 4 to a single or dual-color, front panel mounted LED provides power on/off, sleep, and message waiting indication.

**Reset Switch**

Supporting the reset function requires connecting pin 5 and 7 to a momentary-contact switch that is normally open. When the switch is closed, the board resets and runs POST.

**Power Switch**

Supporting the power on/off function requires connecting pins 6 and 8 to a momentary-contact switch that is normally open. The switch should maintain contact for at least 50 ms to signal the power supply to switch on or off. The time requirement is due to internal de-bounce circuitry. After receiving a power on/off signal, at least two seconds elapses before the power supply recognizes another on/off signal.

### 6.4.1.4 Installing the Processor

The following illustration shows CPU installation components.

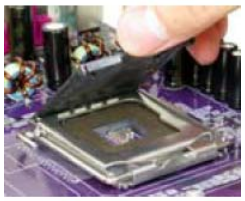
A. Read and follow the instructions shown on the sticker on the CPU cap.




B. Unload the cap

· Use thumb & forefinger to hold the lifting tab of the cap.
· Lift the cap up and remove the cap completely from the socket.

C. Open the load plate



· Use thumb & forefinger to hold the hook of the lever, pushing down and pulling aside unlock it.
· Lift up the lever.
· Use thumb to open the load plate. Be careful not to touch the contacts.

D. Install the CPU on the socket



· Orientate CPU package to the socket. Make sure you match triangle marker to pin 1 location.

E. Close the load plate



· Slightly push down the load plate onto the tongue side, and hook the lever.
· CPU is locked completely.

F. Apply thermal grease on top of the CPU.

G. Fasten the cooling fan supporting base onto the CPU socket on the motherboard.



H. Make sure the CPU fan is plugged to the CPU fan connector. Please refer to the CPU cooling fan user's manual for more detail installation procedure.

### 6.4.1.5 Installing Memory Module

This motherboard accomodates two memory modules. It can support two 240-pin DDR2 800/667. The total memory capacity is 4 GB.

**DDR2 SDRAM memory module table**

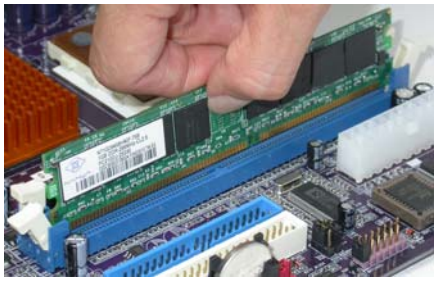
| Memory module | Memory Bus |
|---|---|
| ***DDR2 667*** | ***333 MHz*** |
| ***DDR2 800*** | ***400 MHz*** |

You must install at least one module in any of the two slots. Each module can be installed with 2 GB of memory; total memory capacity is 4 GB.

**Installation Procedure**

Refer to the following to install the memory modules.

1. This motherboard supports unbuffered DDR2 SDRAM .
2. Push the latches on each side of the DIMM slot down.
3. Align the memory module with the slot. The DIMM slots are keyed with notches and the DIMMs are keyed with cutouts so that they can only be installed correctly.
4. Check that the cutouts on the DIMM module edge connector match the notches in the DIMM slot.
5 . Install the DIMM module into the slot and press it firmly down until it seats correctly. The slot latches are levered upwards and latch on to the edges of the DIMM.
6. Install any remaining DIMM modules.



### 6.4.1.6 Installing a Hard Disk Drive/CDROM / IDE Drive

This section describes how to install IDE devices such as a hard disk drive and a CDROM drive.

**IDE1: Primary IDE Connector**

The first hard drive should always be connected to IDE1.




IDE devices enclose jumpers or switches used to set the IDE device as MASTER or SLAVE. Refer to the IDE device user's manual. Installing two IDE devices on one cable, ensure that one device is set to MASTER and the other device is set to SLAVE. The documentation of your IDE device explains how to do this.

**Installing Serial ATA Hard Drives**

To install the Serial ATA (SATA) hard drives, use the SATA cable that supports the Serial ATA protocol. This SATA cable comes with an SATA power cable. You can connect either end of the SATA cable to the SATA hard drive or the connector on the motherboard.




**SATA cable (optional) SATA power cable (optional)**

Refer to the illustration below for proper installation:

1 Attach either cable end to the connector on the motherboard.

2 Attach the other cable end to the SATA hard drive.

3 Attach the SATA power cable to the SATA hard drive and connect the other end to the power supply.

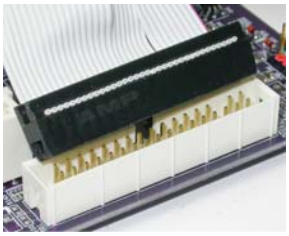



### Installing a Floppy Diskette Drive

The motherboard has a floppy diskette drive (FDD1) interface and ships with a diskette drive ribbon cable that supports one or two floppy diskette drives. You can install a 5.25-inch drive and a 3.5-inch drive with various capacities. The floppy diskette drive cable has one type of connector for a 5.25-inch drive and another type of connector for a 3.5-inch drive.

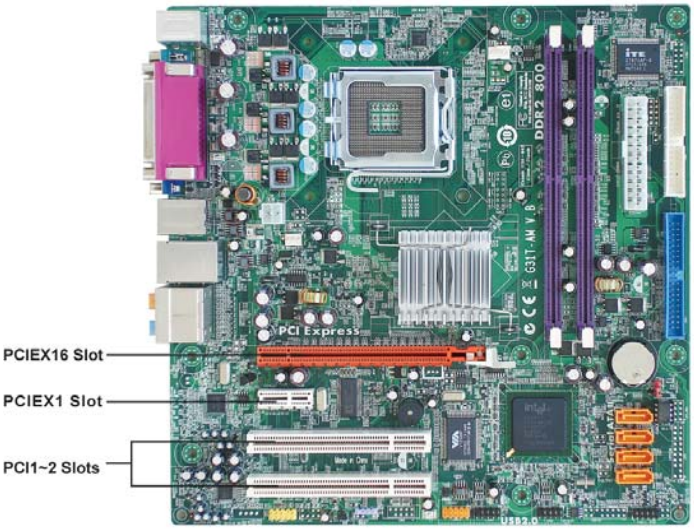
### FDD1: Floppy Disk Connector

This connector supports the provided floppy drive ribbon cable. After connecting the single end to the onboard floppy connector, connect the remaining plugs on the other end to the floppy drives correspondingly.



### 6.4.1.7 Installing Add-on Cards

The slots on this motherboard are designed to hold expansion cards and connect them to the system bus. Expansion slots are a means of adding or enhancing the motherboard's features and capabilities. With these efficient facilities, you can increase the motherboard's capabilities by adding hardware that performs tasks that are not part of the basic system.

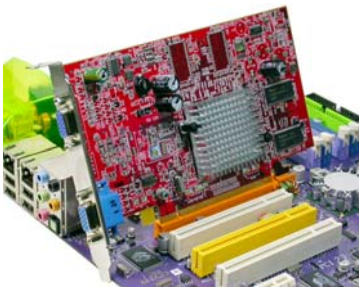



**PCIEX16 Slot** The PCI Express x16 slot is used to install an external PCI Express graphics card that is fully compliant to the PCI Express Base Specification revision 1.1.

**PCIEX1 Slot** The PCI Express x1 slots are fully compliant to the PCI Express Base Specification revision 1.0a.

**PCI1~2 Slots** This motherboard is equipped with two standard PCI slot. PCI stands for Peripheral Component Interconnect and is a bus standard for expansion cards, which for the most part, is a supplement of the older ISA bus standard. The PCI slots on this board are PCI v2.3 compliant.

Follow these instructions to install an add-on card:
1. Remove a blanking plate from the system case corresponding to the slot you are going to use.
2. Install the edge connector of the add-on card into the expansion slot. Ensure that the edge connector is correctly seated in the slot. 3 Secure the metal bracket of the card to the system case with a screw.



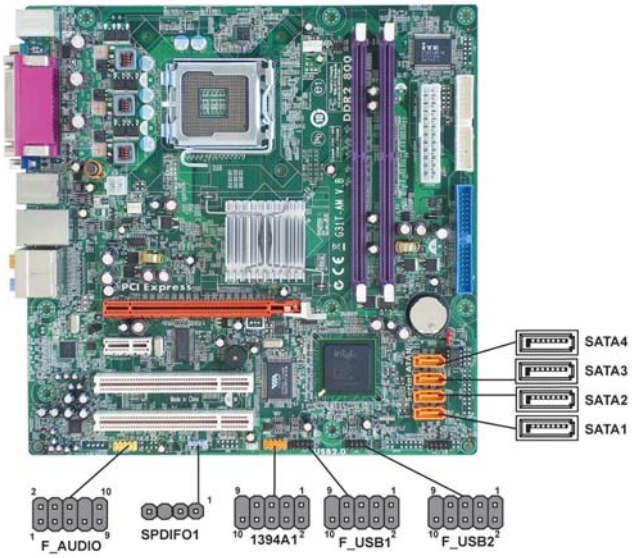
PCIEX16



PCI Card

***Connecting Optional Devices***

Refer to the following for information on connecting the motherboard's optional devices:




**F_AUDIO: Front Panel Audio header for Azalia**

This header allows the user to install auxiliary front-oriented microphone and line-out ports for easier access.

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | PORT 1L | 2 | AUD_GND |
| 3 | PORT 1R | 4 | PRESENCE# |
| 5 | PORT 2R | 6 | SENSE1_RETURN |
| 7 | SENSE_SEND | 8 | KEY |
| 9 | PORT 2L | 10 | SENSE2_RETURN |

**SATA1~4: Serial ATA connectors**

These connectors are use to support the new Serial ATA devices for the highest date transfer rates (3.0 Gb/s), simpler disk drive cabling and easier PC assembly. It eliminates limitations of the current Parallel ATA interface. But maintains register compatibility and software compatibility with Parallel ATA.

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | Ground | 2 | TX+ |
| 3 | TX | 4 | Ground |
| 5 | RX | 6 | RX+ |
| 7 | Ground | - | |

**1394A1: IEEE 1394A header (Optional)**

Connect this header to any device with IEEE 1394a interface.

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | TPA+ | 2 | TPA |
| 3 | GND | 4 | GND |
| 5 | TPB+ | 6 | TPB |
| 7 | Cable-Power | 8 | Cable-Power |
| 9 | Key Pin | 10 | GND |

**F_USB1~2: Front Panel USB headers**

The motherboard has four USB ports installed on the rear edge I/O port array. Additionally, some computer cases have USB ports at the front of the case. If you have this kind of case, use auxiliary USB connector to connect the front-mounted ports to the motherboard.

| Pin | Signal Name | Function |
|---|---|---|
| 1 | USBPWR | Front Panel USB Power |
| 2 | USBPWR | Front Panel USB Power |
| 3 | USB_FP_P0 | USB Port 0 Negative Signal |
| 4 | USB_FP_P1 | USB Port 1 Negative Signal |
| 5 | USB_FP_P0+ | USB Port 0 Positive Signal |
| 6 | USB_FP_P1+ | USB Port 1 Positive Signal |
| 7 | GND | Ground |

| | | |
|---|---|---|
| 8 | GND | Ground |
| 9 | Key | No pin |
| 10 | USB_FP_OC0 | Overcurrent signal |

*Please make sure that the USB cable has the same pin assignment as indicated above. A different pin assignment may cause damage or system hang-up.*

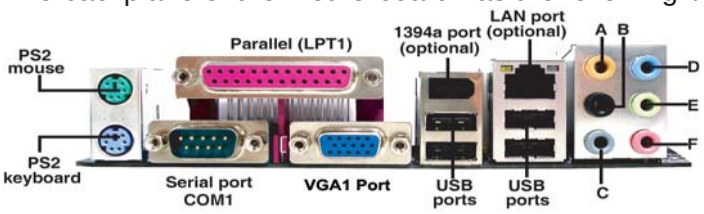
**SPDIFO1: SPDIF out header**

This is an optional header that provides an S/PDIF (Sony/Philips Digital Interface) output to digital multimedia device through optical fiber or coaxial connector.

| Pin | Signal Name | Function |
|---|---|---|
| **1** | **SPDIF** | **SPDIF digital output** |
| **2** | **+5VA** | **5V analog Power** |
| **3** | **Key** | **No pin** |
| **4** | **GND** | **Ground** |

**Connecting I/O Devices**

The backplane of the motherboard has the following I/O ports:




| | |
|---|---|
| **PS2 Mouse** | Use the upper PS/2 port to connect a PS/2 pointing device. |
| **PS2 Keyboard** | Use the lower PS/2 port to connect a PS/2 keyboard. |
| **Parallel Port (LPT1)** | Use LPT1 to connect printers or other parallel communi cations devices. |
| **Serial Port (COM1)** | Use the COM1 port to connect serial devices such as mice or fax/modems. |
| **VGA1 Port** | Connect your monitor to the VGA1 port. |
| **LAN Port (optional)** | Connect an RJ-45 jack to the LAN port to connect your computer to the Network. |
| **1394A Port (optional)** | Use the 1394A port to connect 1394 devices. |

| | |
|---|---|
| **USB Ports** | Use the USB ports to connect USB devices. |
| **Audio Ports** | Use the audio jacks to connect audio devices. The D port is for stereo line-in signal, while the F port is for microphone in signal. This motherboard supports 8-channel audio de vices that correspond to the A, B, C, and E port respectively. In addition, all of the 3 ports, B, C, and E provide users with both right & left channels individually. Users refer to the following note for specific port function definition. |

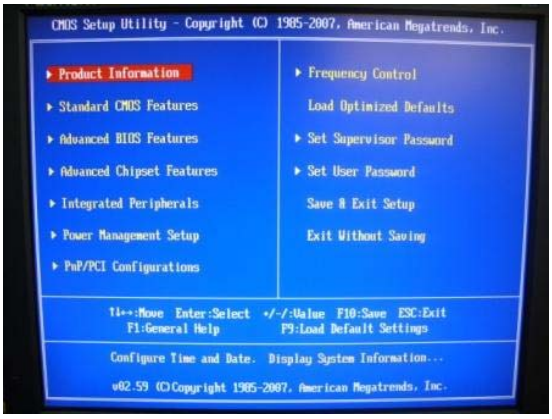
### 6.4.1.8 BIOS Setting

The computer uses the latest “American Megatrends Inc. ” BIOS with support for Windows Plug and Play. The CMOS chip on the motherboard contains the ROM setup instructions for configuring the motherboard BIOS.

**Entering the Setup Utility**

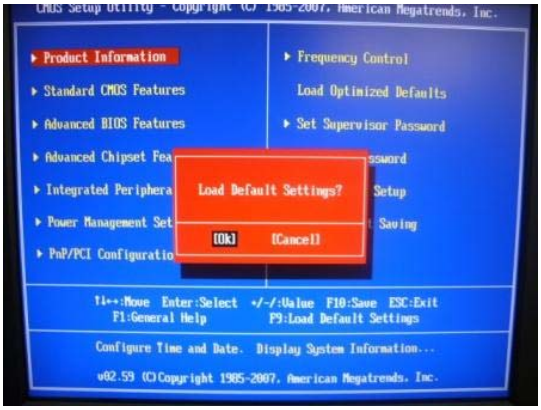
When you power on the system, BIOS enters the Power-On Self Test (POST) routines. POST is a series of built-in diagnostics performed by the BIOS. After the POST routines are completed, the following message appears:

1) Press DEL to enter SETUP
   Press the delete key to access the BIOS Setup Utility.

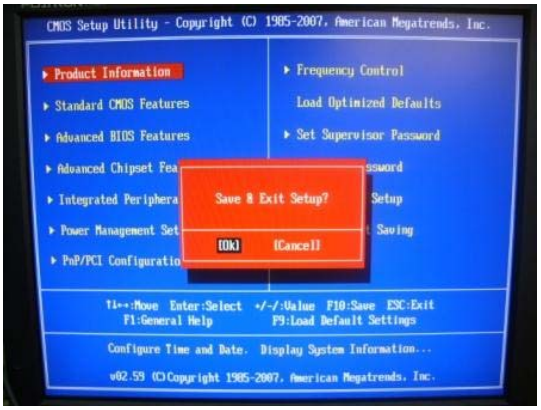



BIOS Main Menu

2) Press F9 to load Default Settings. [OK]
3) Press F10 to Save and Exit. [OK]




F9 Load Default Settings



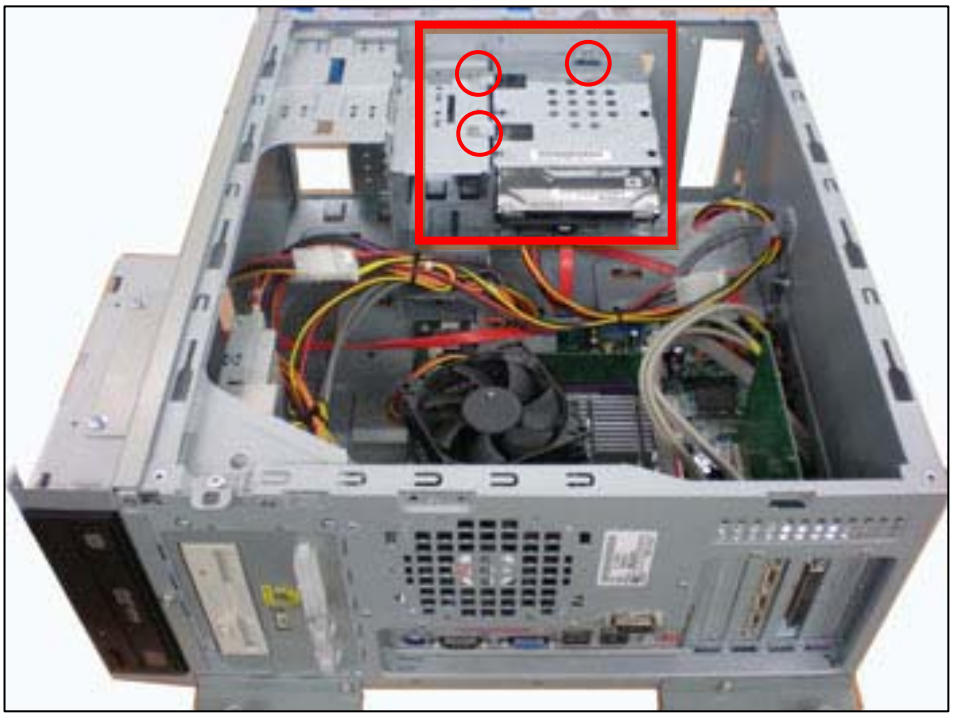

F10 Save and Exit

### 6.4.2 HDD

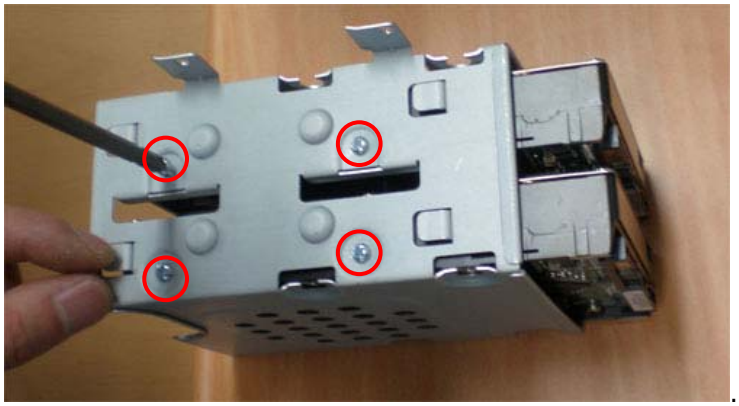
It is a storage device of CE module within ATM System (generic auxiliary storage device) to take installation CD to allow for OS(Windows XP) and AP program installation.



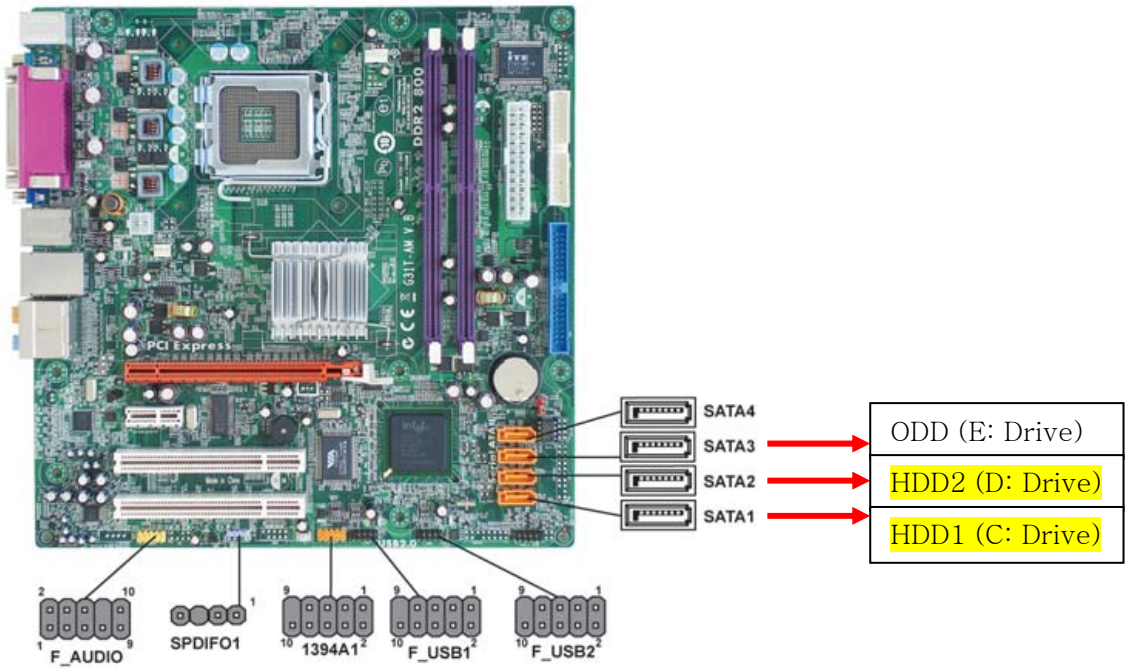

HDD Sample Picture



HDD Location and Screwable point



Screwable Point of HDD



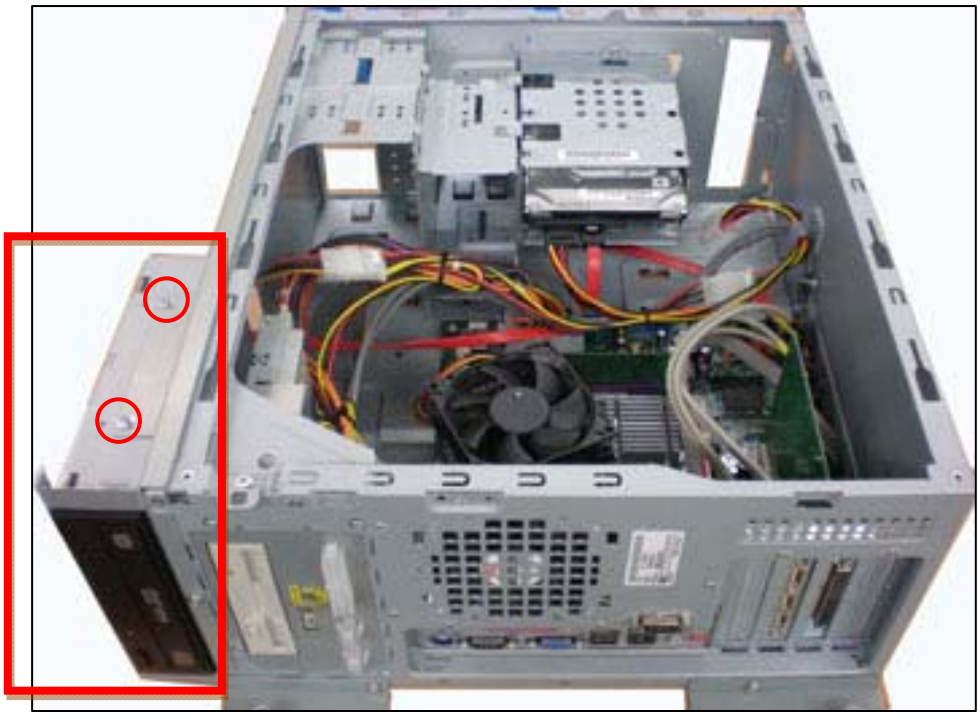

HDD SATA Cable connection

### 6.4.3 ODD

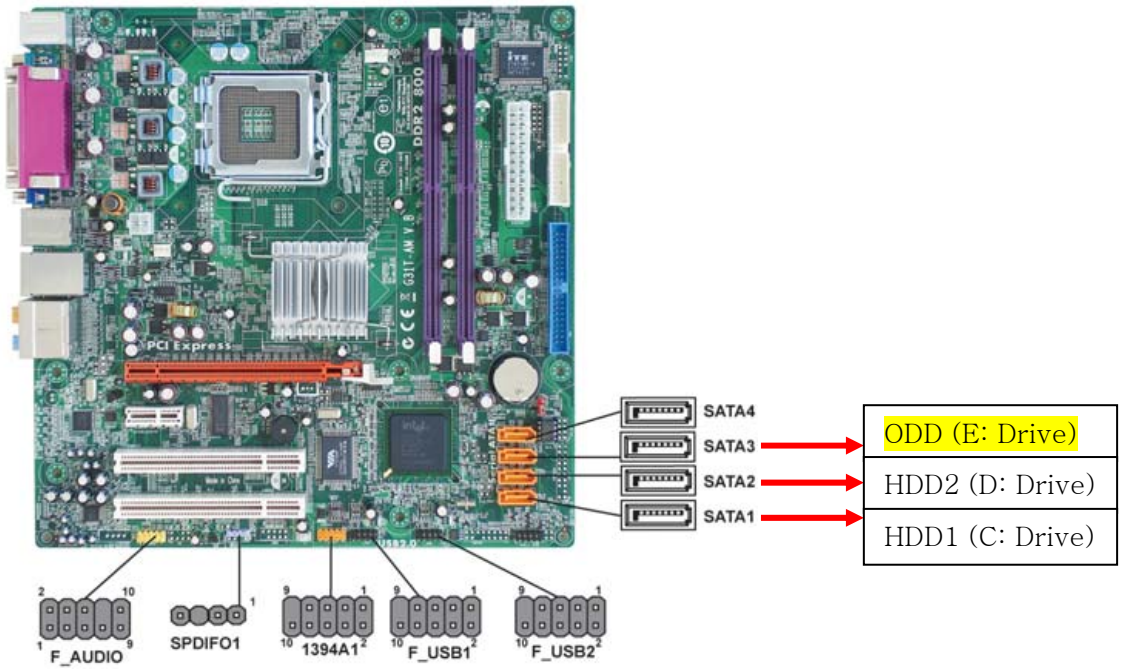
It is a storage device of CE module within ATM System (generic auxiliary storage device) to take installation CD to allow for OS(Windows XP) and AP program installation.




ODD( CDROM / DVD ROM ) Sample Picture



**ODD Location and Screwable point**



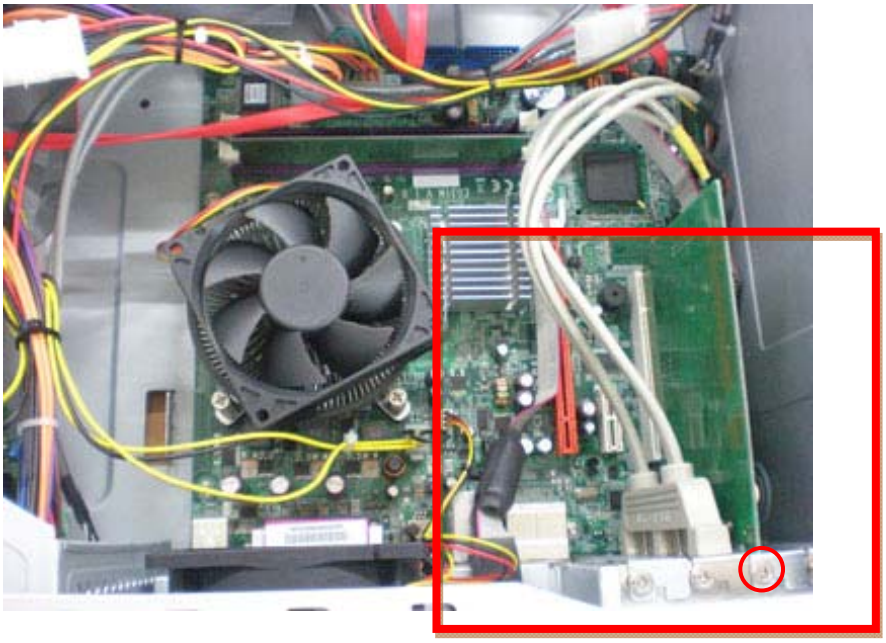

ODD SATA Cable connection

### 6.4.4 PCI Serial Card

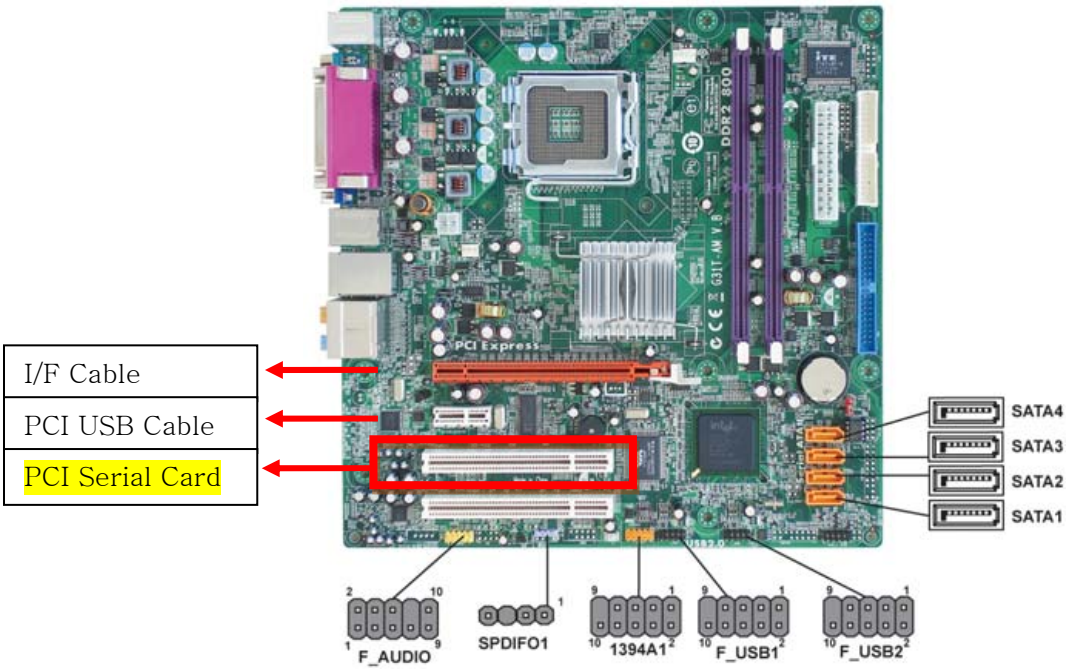
It is a 4Port Serial Communication device of CE module within ATM System to communicate with Units(CDU, MCU, EDU etc).



4 Port PCI Serial Card



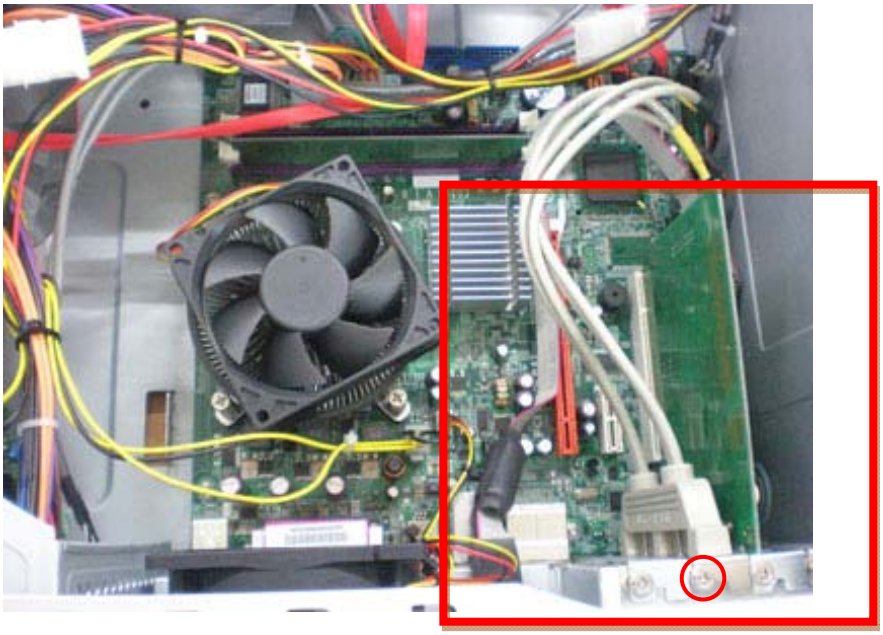
4 PORT PCI Serial Card Location and Screwable point



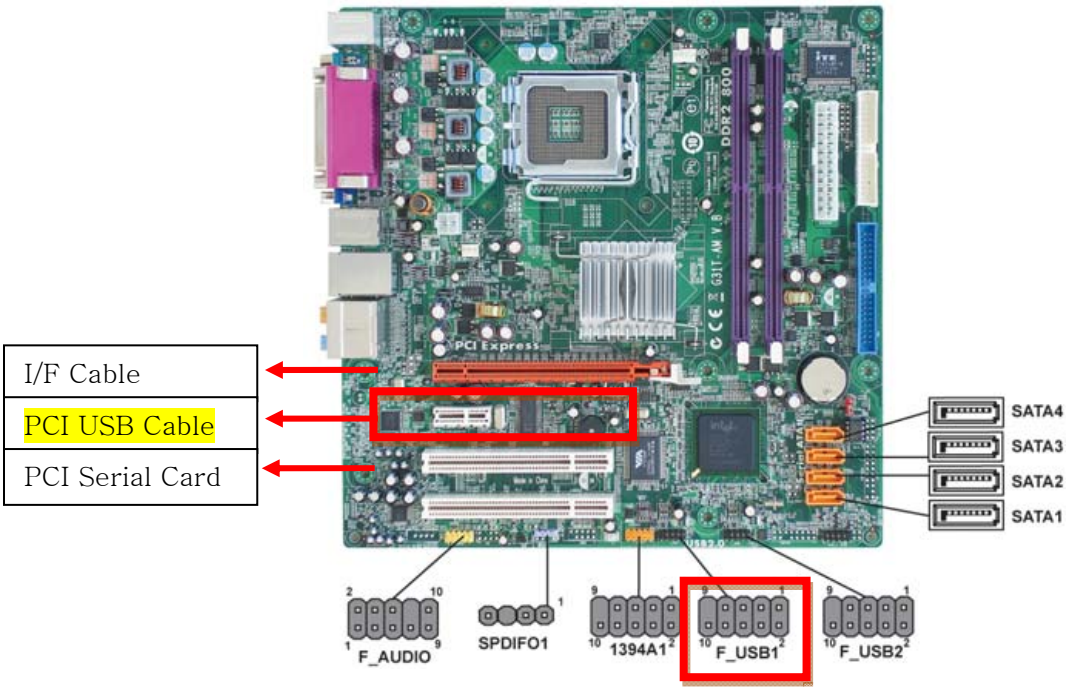

PCI Slot connection

### 6.4.5 PCI USB Cable



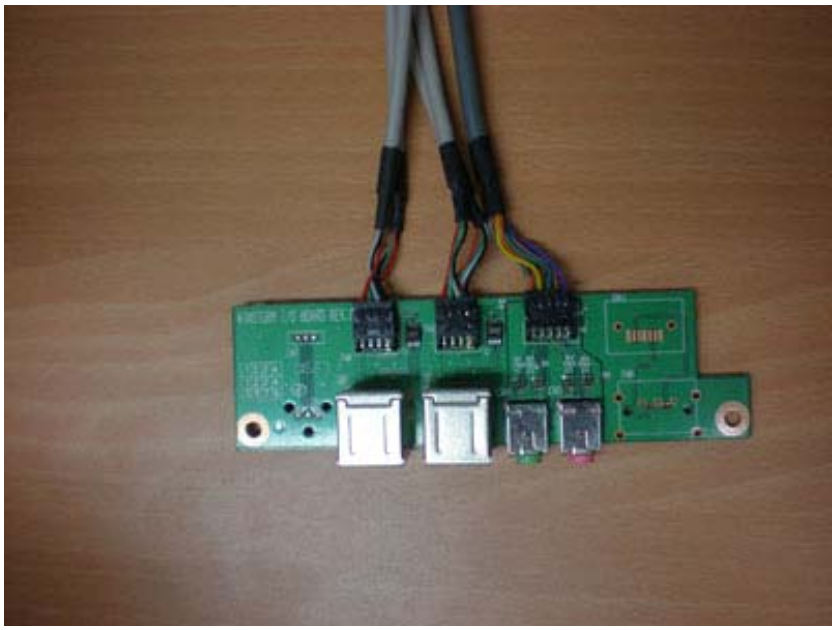


PCI USB Location and Screwable point

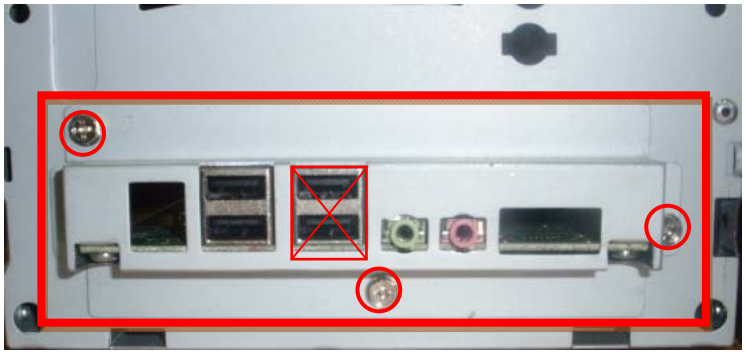



PCI Slot connection

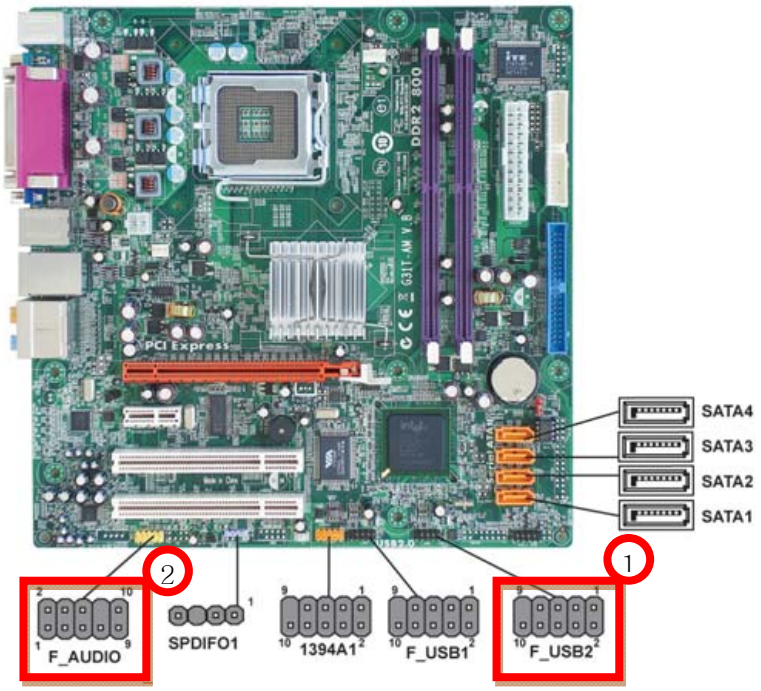
### 6.4.6 Front I/O Board (USB Slot)



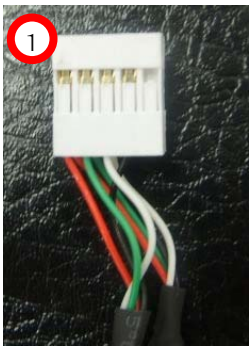
Front I/O Board



Front I/O Board Location and Screwable point

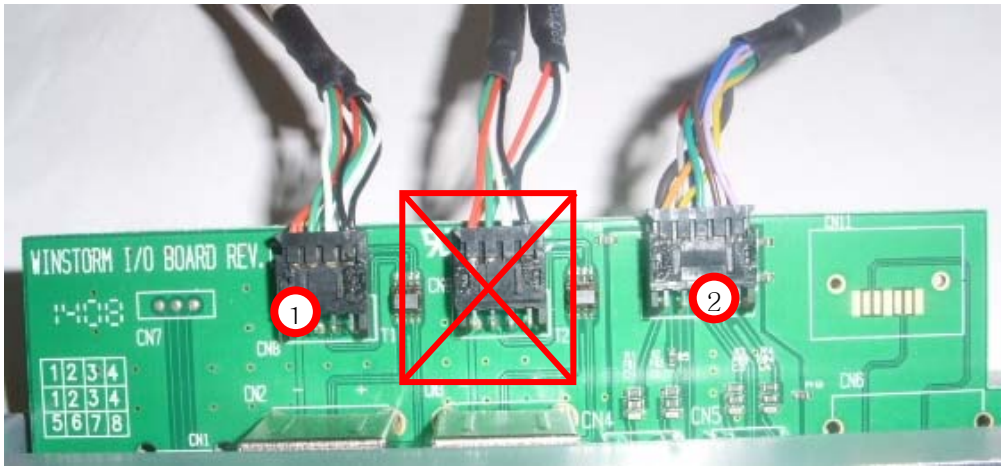



Cable connection





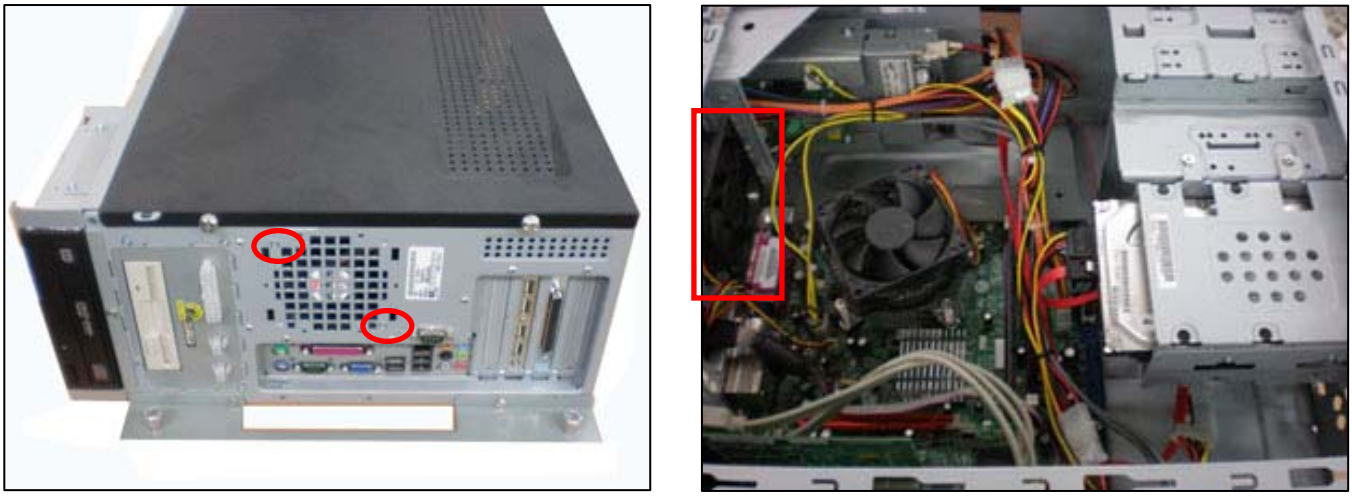




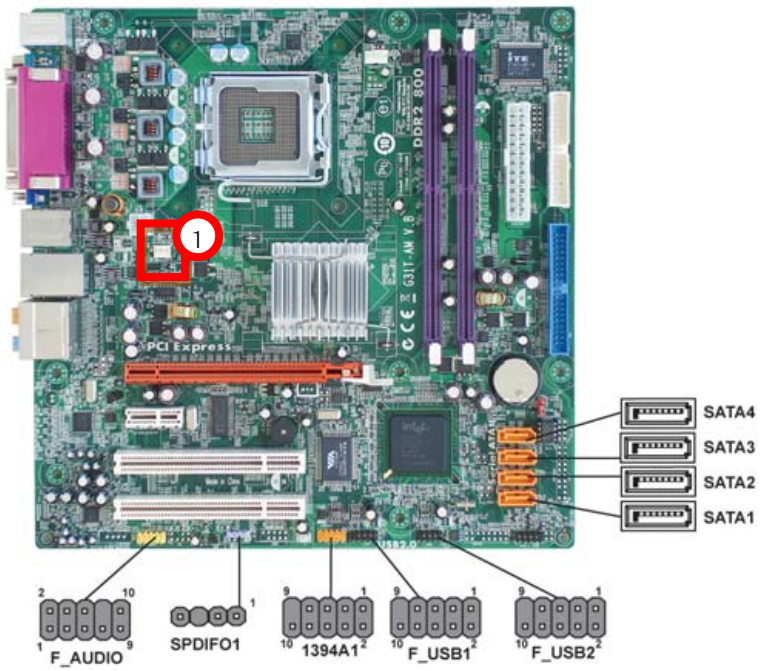
### 6.4.7 SYS FAN



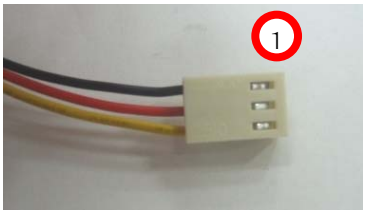

SYSTEM FAN



SYS FAN Location and Screwable point




SYS FAN Cable connection



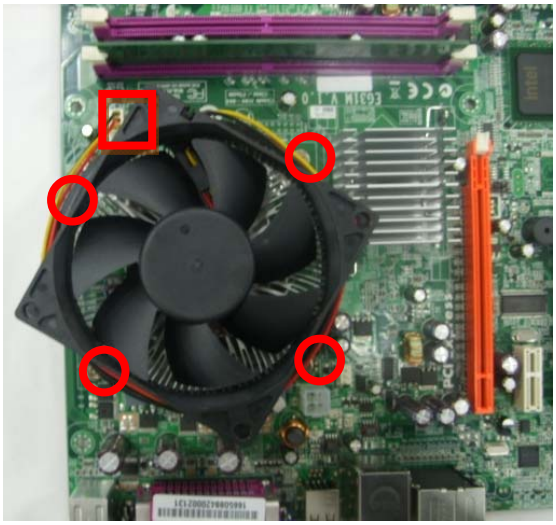

FAN Power Connector

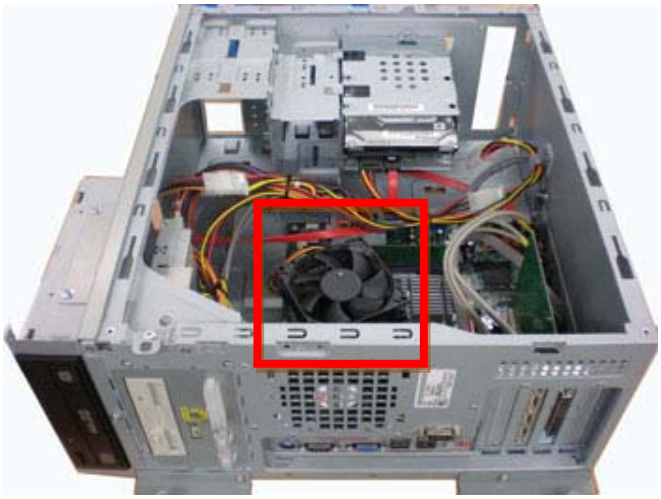
### 6.4.8 CPU Cooler



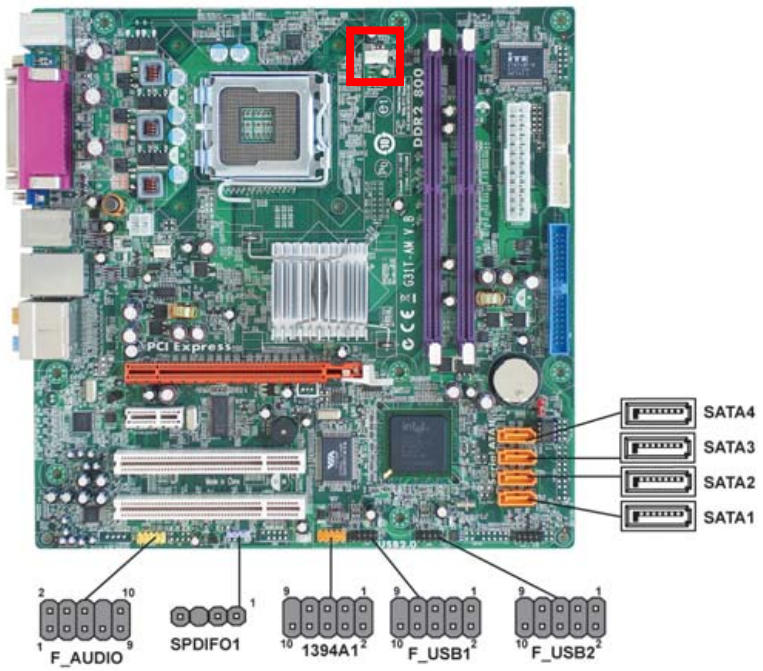


CPU Cooler



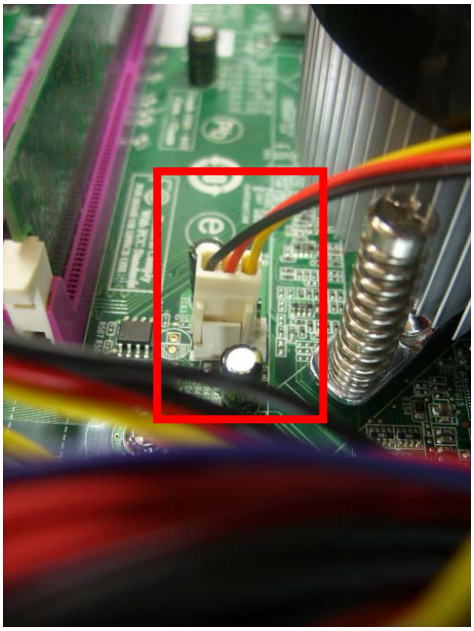


CPU Cooler Location and Screwable point




CPU Cooler Cable connection

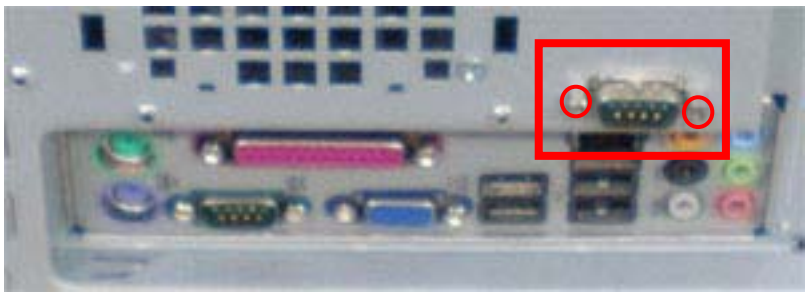




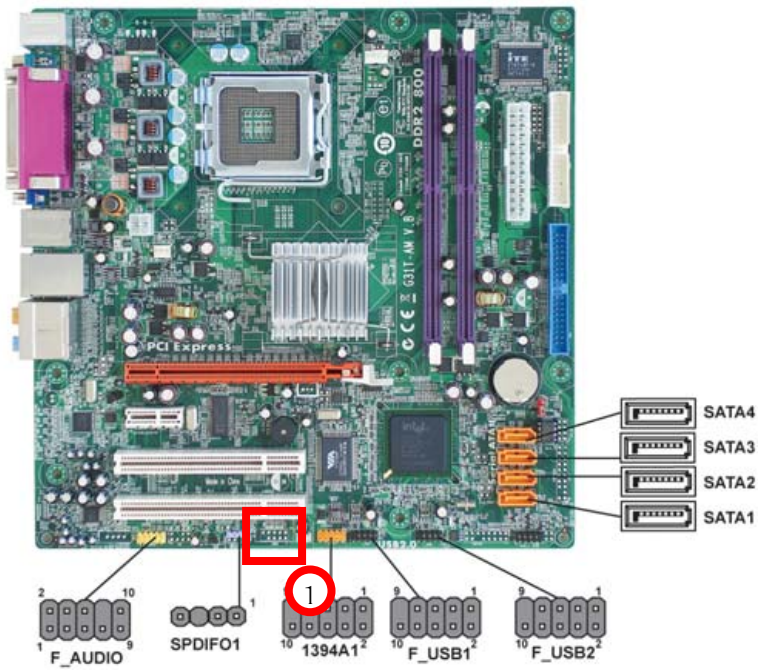
### 6.4.9 Serial Cable(COM2)



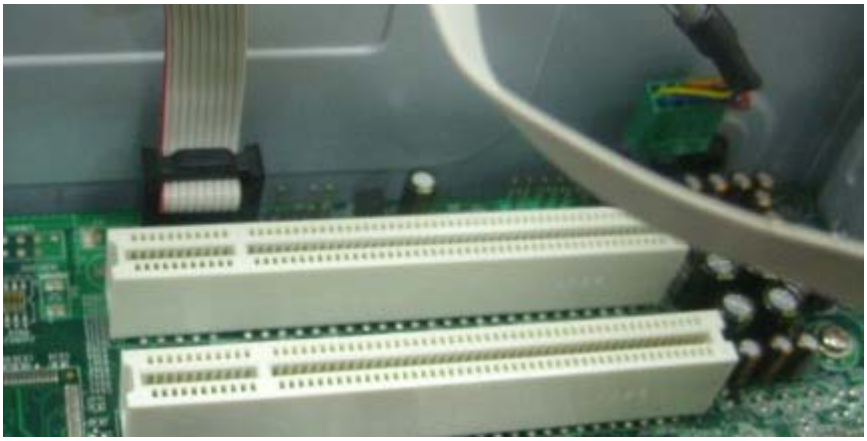
Serial Cable



Serial Cable(COM2) Location and Screwable point

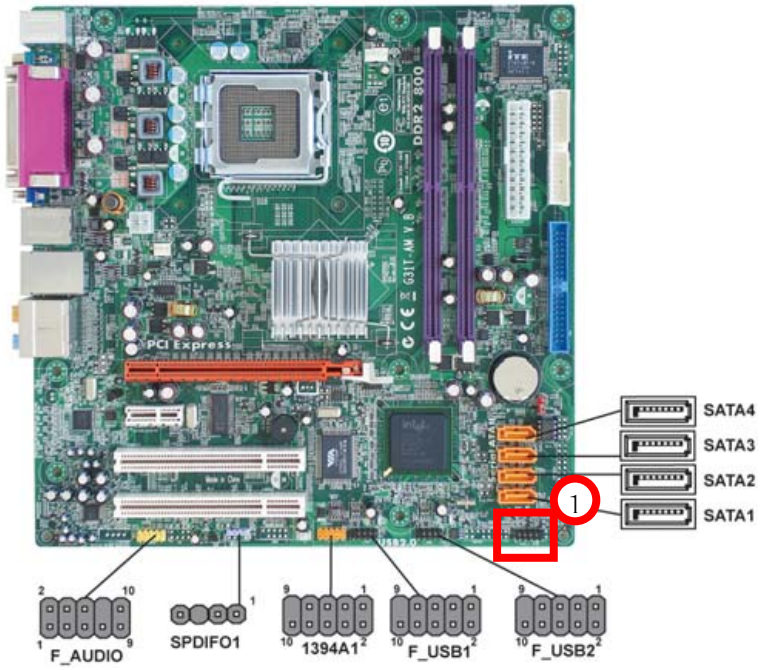



Serial Cable connection

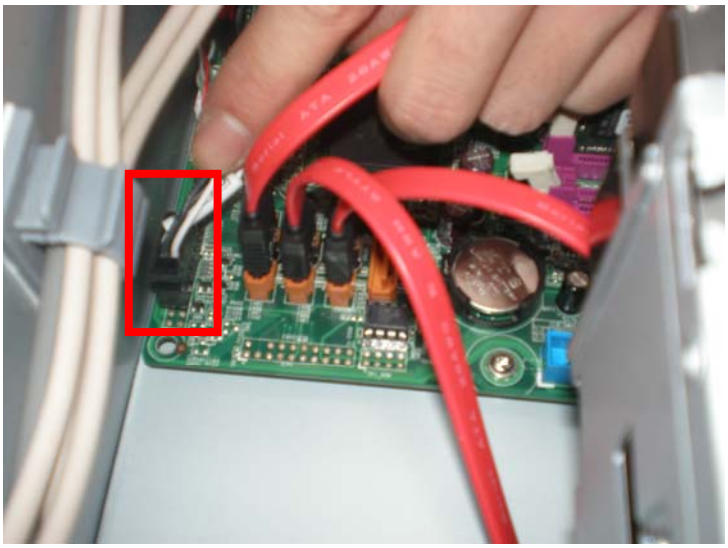


### 6.4.10 Main Board Button I/F Cable

Mainboard Power Button and Reset Button can be controlled by PNC Unit through the Button I/F Cable.




Main board Button I/F Cable connection



# Chapter 7. Cash Dispensing Unit (CDU)

# 7.1 Overview

This Cash Dispensing Unit (CDU) is located on the right side of the safe door and can be divided into 5 major modules as follows.

Body Module
Presenter Assembly
Four Feed Modules
Four Cash Cassettes
Reject & Retract Box

Body Module is composed of two lever type Double Bill Detection mechanism and a high precision sensor, which measures the thickness of the transmitted bills and verifies if it is one or more than two bills. It presents only “normal” bills to customers by filtering all of the “bad” bills through Gate Solenoid operation.

Presenter Assembly is a mechanism that provides customers with bills stacked in the Body Module and the assembly direction changes whether it is Front Access type or Side Access type.

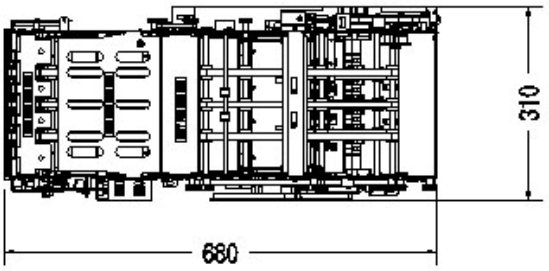
Feed Module transfers the bills mounted inside the cash cassette to cash dispenser, and measures the number of dispensed bills, quantity of skew, size of bills, and space between bills. Also, the Clutch Assembly that supplies power to Main Motor is contained in the Feed Module which enables dispensing bills from a certain cash cassette with just one motor.

The cash cassette has the Bill Pick-up Module made of light plastic, which is user-friendly and can be easily replaced in the branch.

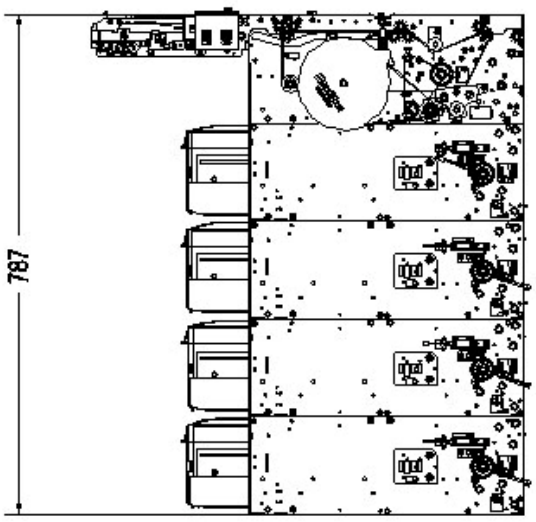
Reject & Retract Box is an integral system that transfers defective bills from cash cassette to Reject Department while sending the bills withdrawn but not taken by customers to the Retract Department where the bills can be safely stored.

### 7.1.1 Appearance and Dimension

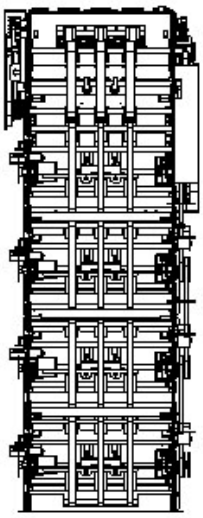
The following figures show the three sectional diagrams of the cash dispenser.
Its dimension is 680mm high, 310 mm wide and 787mm long.




Plane View




Side View (Right)



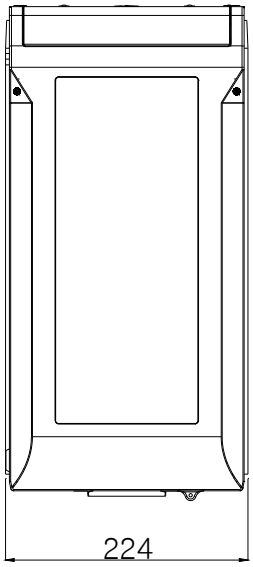
Front View

Fig. 7.1 Cash dispenser Appearance and Dimension

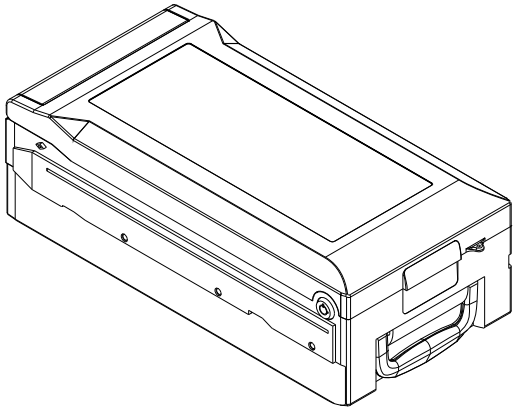
The following figures show three sectional diagrams of the cash cassette. Cash cassette is 141.3mm high, 224mm wide and 447mm long.

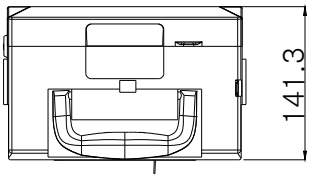
**[WARNING!]**

**Because the Pick-up Module in the cash cassette is made of plastic, which is fragile and vulnerable to any shock, be careful not to drop or damage the cash cassette while handling or transferring the module.**

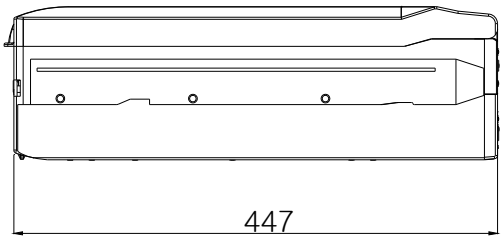



Plane View






Front View




Side View (Right)

Fig. 7.2 Cassette Appearance and Dimension

## 7.1.2 Functional Description

### 7.1.2.1 Actuator Diagram

Electromagnetic components used for the cash dispenser are three motors, four micro-clutches, and two solenoids. The functions and roles of each component are as follows.

**1) Main Motor**

Main Motor is a major power source for transferring bills picked up in the cash cassette to the temporary stacker through the transport path. Power is supplied through the micro-clutch located in each feed module.

**2) Cam Motor**

Cam Motor is used for transferring the notes stacked in the temporary stacker to the upper transport path or moving the temporary stacker.

**3) Delivery Motor**

Delivery Motor carries the bills transferred to the upper transport path to the Presenter Assembly, making them ready for being delivered to the final customer.

**4) Micro-clutch**

In order to dispense bills from a certain cash cassette, power should be supplied from the Main Motor to the cash cassette. That is, for the release of the bills only from that cash cassette, the micro clutch of the Feed Model in that cassette should work while micro clutches in the other feed modules don't.

**5) Gate Solenoid**

The bills picked up in the cash cassette are detected by number of sensors and separated into good and bad notes. Good notes are released to customers while bad notes are transferred to the Reject Box. It is Gate Solenoid which does the separation job, and since it should distinguish the notes simultaneously in the short span of the time, the disassembly and assembly of the Gate Solenoid requires an adjustment point.

### 6) Exit Shutter Solenoid

To convey normal bills to customers, the Exit Shutter should be opened or closed. The Shutter is designed to require the lock mechanism to prevent customers from opening the Shutter at their own discretion.

Electro-magnetic components used for this cash dispenser is illustrated in Fig.7.3

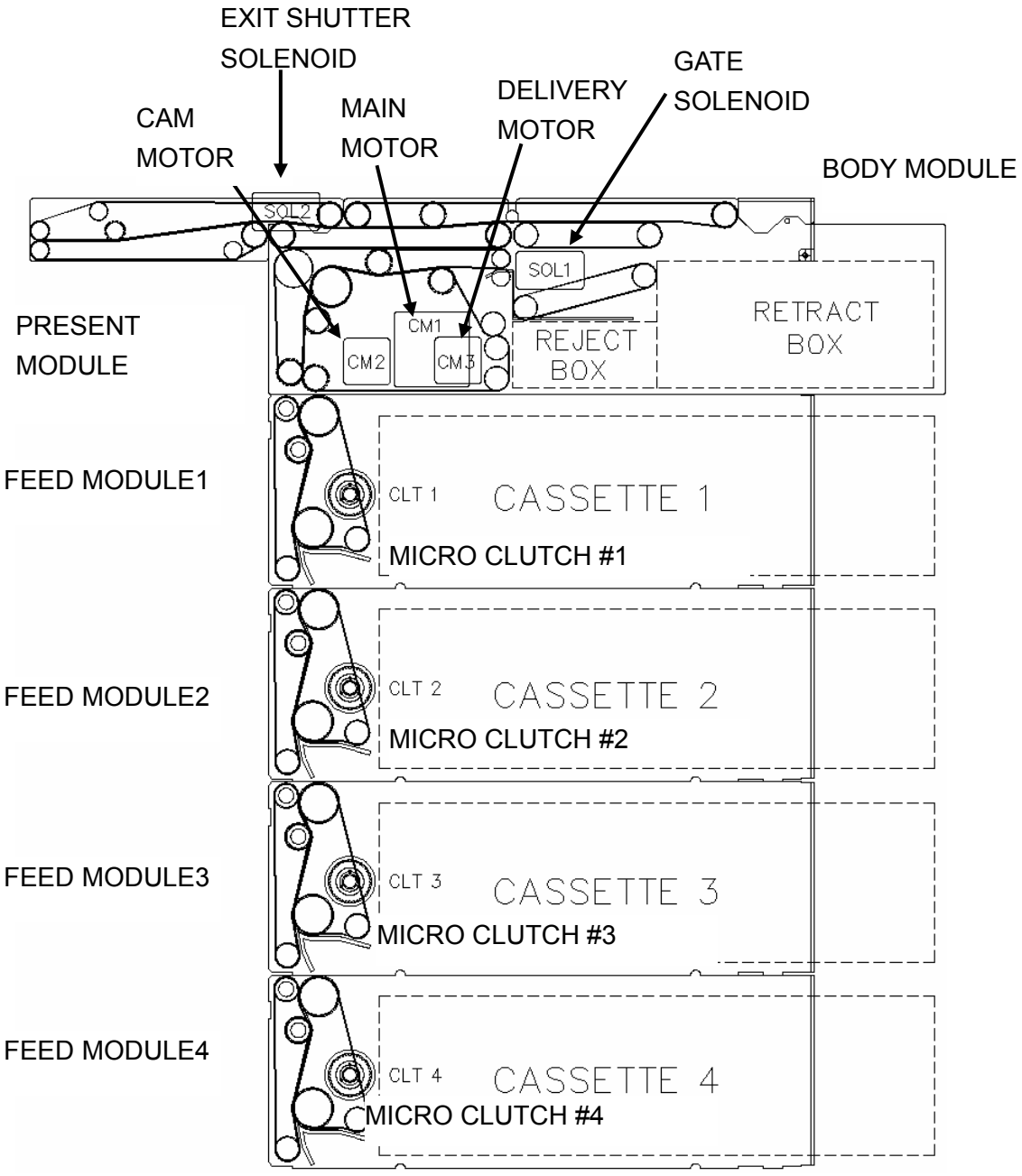



Fig. 7.3 Actuator Diagram

#### 7.1.2.2 Sensor Diagram

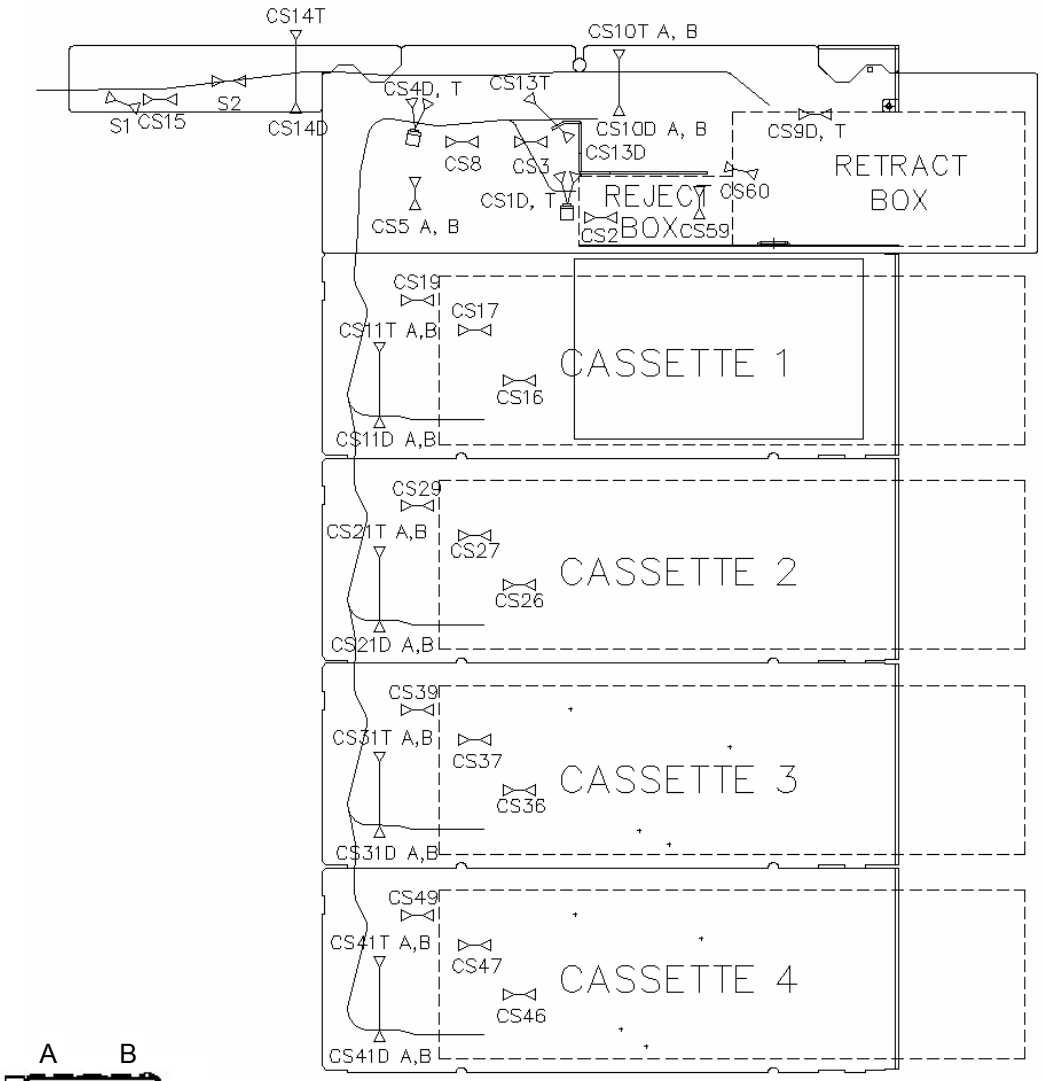
Inside the cash dispenser, various types of sensors having different functions and roles are embedded. While some of the sensors look identical, their roles are still different, which requires a careful attention.

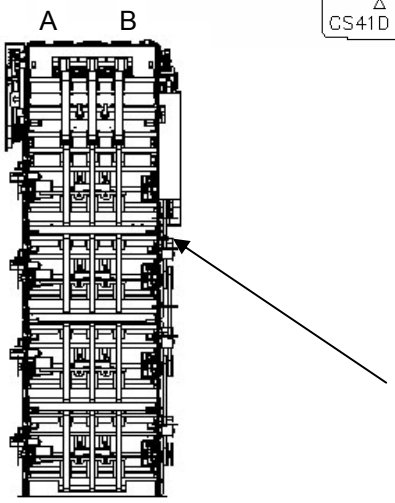
Photo Transmitted Sensor (Separating type)
Photo Transmitted Sensor (Coupling type)
Photo Reflecting Sensor
Micro Switch
Magnetic Sensor

Normally, sensor consists of two kinds of components
Sending a signal : LED (Light Emitting Diode)
Receiving a signal : Tr (Transistor)

The separating type transmitted sensor in the Transport path has LED (Labeling:"D") at the bottom and Tr (Labeling:"T") at the top to minimize the impact of external solar light and dust. It is important not to change the assembly direction of LED and Tr during the disassembly or replacement process. Also, two sensors are placed in parallel in one Sensor Bracket. In order to distinguish between the two sensors, the one closer to the Controller board will be called "A," while the rear one called "B."

Sensors used for this cash dispenser is illustrated in Fig.7.4




Front View

Controller board of Cash dispenser

Fig. 7.4 Sensor Diagram

# 7.2 Trouble shooting

## 7.2.1 Troubleshooting Tools

The followings are the procedures for handling the problems related to the cash dispenser, which includes receiving the complaints, dispatching a technician to the branch, verifying the problem, inspecting the machine, and taking proper actions.

**Trouble Verification**

1) Receiving Reports on Problems from the branch personnel
   Record when the problem has occurred and what problem it is. For intermittent errors check the frequency. It is important to get the detailed transaction flow at the time when the trouble occurred, which can be very useful for resolving the problem.

2) LED on the Controller Board
   See if 2 LEDs are blinking on the middle of the Controller Board.

3) Power LED on the Controller Board
   Check if one LED on the middle of the Controller Board is illuminated and green.

4) The movement of 7 segments of the Controller Board
   Check if the number of 7 segment is increasing continuously or stop.

5) Error Code in the Supervisor Screen
   Go to the Supervisor Screen through the Side Operator Panel and check the error code. Using the Error Code List in Chapter 15, identify the problem area and take basic actions at the branch.

6) Software Journal file & Trace file
   Connect the Key Board to the CE engine, enter a folder through Side Operator Panel to get Journal file and Trace file, and send the files to Hyosung staff for further identification of the problem. However, troubleshooting through software files can take time to get the feedback due to data transmission time to Hyosung, and it requires the exact time when the trouble has occurred.

### 7.2.2 Scope of Repair at the Field Level (Recommendations)

The scope of repair that can be supported at the field level is limited only to fixing communication or power cable problem, removing note jams, checking motor, sensor or controller board problems, and adjustment/lubrication/cleaning. For problems with other components, replace the module and inspect and fix it at the Depot level.

This is just a recommendation and can be adjusted depending on the field conditions or the capability of the technician involved.

| NO | FIELD REPAIR ITEMS | TOOL | REMARK |
|---|---|---|---|
| 1 | Communication Cable | Slotted Screw driver, a voltmeter | |
| 2 | Power Cable | | |
| 3 | Note Jam | | |
| 4 | Too many Rejected bills | | |
| 5 | Replacement of Cash Cassette | Q-tip, alcohol, swab | |
| 6 | Motor, Solenoid, Micro-Clutch | Slotted Screw driver, a voltmeter | While checking the Motor is possible, the replace is difficult. |
| 7 | Sensor | | |
| 8 | Controller Board | | |
| 9 | Mechanical Adjustment | | |
| 10 | Lubrication | Recommended lubrication | |
| 11 | Cleaning | Air blower, Q-tip, alcohol, swab | |

Items not included above cannot be checked or repaired in the field. Replace the entire unit and repair it at the Depot level.

### 7.2.3 Troubleshooting Procedure

1) When arriving at the branch which reported the complaint, identify the problem focusing on the module where trouble has been reported. For further details, refer to Chapter 10.Error code and Troubleshooting. If the problem lies in the cash dispenser, move to the next step described below.

2) Enter the Supervisor Mode at the Side Operator Panel and check the Status LED on the initial screen. Check to see if the error field contains a red light and there is an error code displayed at the bottom of the screen. If there is an error code on the screen, identify the type of error by checking the error code table in the manual.

3) If no error code appears on the screen, enter the Technician Mode to initialize the system or conduct a functional test to see if the same problem occurs.

4) Using the error code information in the manual, identify the items with potential problems and determine whether the repair can be supported in the Field.

5) If the problem falls into the category of the field repair items, take immediate actions following the procedures described in Chapter 7.2.3.1~9. If not, replace the cash dispenser.

6) When replacing the Cash Dispenser, acquire and store the log file in the following directory.
C:\Common\logs\NHTrace (from GCAT8.0 version)
C:\Program Files\Nautilus Hyosung\Trace

#### 7.2.3.1 Communication Problem

1) Check if two LEDs(TxD, RxD) and two 7 segment at the CDU Controller Board blink or increase number.
2) See if USB Communication cable is properly plugged on the CE engine and CDU controller, and then unplug and plug again. Check whether the cable coating has been peeled off or the cabling is proper.
3) Go to the Side Enhanced Operator Panel, enter the Start>Control Panel>Device Property, and see if the CDU inside the USB3-USB 1Hub is properly set up.
4) Replace the CDU Controller Board.
5) Replace the CE engine.

#### 7.2.3.2 Power Problem

1) Check if the LED(PWR) at the CDU Controller Board is on.
2) Measure the voltage of CDU Controller Board using a voltmeter, to see if it has normal voltage output.
3) Change the CDU Controller Board.
4) Look at the LED status of the Power Supply and replace it if there is any problem.

#### 7.2.3.3 Bill Jams

1) Power off the machine and pull out the CDU rail to the full extent.
2) Remove any debris or bills jammed in the transportation path,
3) While removing the jammed bills, check if the Roller Belt is in the right position since it could be detached from the Roller during the Jam process.

**[WARNING!]**

**If the belt is detached from the Roller, the lifespan of the belt can be dramatically reduced which can result in breakage. Therefore, it is extremely important to check if the belt is positioned at the right place after removing the jammed bills.**

### ※ How to Clear Bill Jams

1) Turn ATM power off via the EOP (Enhanced Operator Panel). Press and hold down the ON and OFF switch on the left hand side of the EOP, this will initiate an ATM stop process and shut down process, when SHUTDOWN is displayed you may release the switch, wait until machine shuts down completely to clear jams.



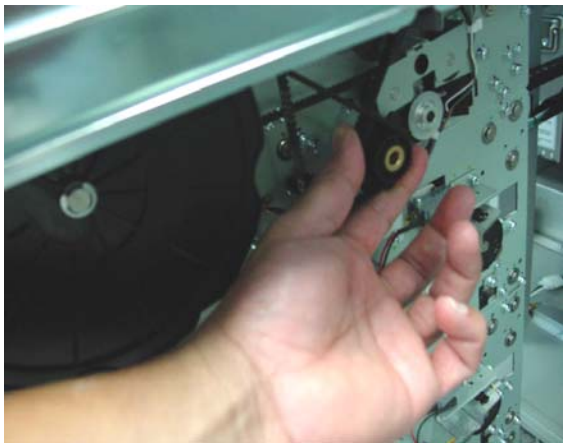

**[NOTE!]** Any branch Personnel should not attempt to remove any jams without first powering down the ATM

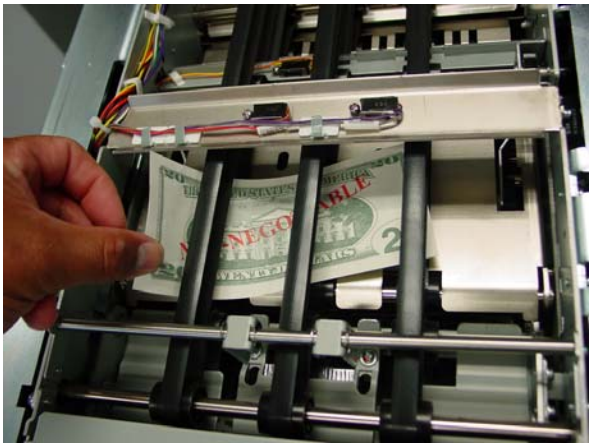
2) Undock the CDU and slide out completely.

3) First check for jammed notes in the upper transporter of the cash dispenser. If there are jammed notes carefully take out notes caught between the belts from whichever side convenient.



4) Next check for jammed notes inside temporary stacker of cash dispenser. If there are jammed notes inside a temporary stacker, slowly turn the black knob counter-clockwise, located on the right side of the cash dispenser, until the stacker raised so that you can access the jammed bills.

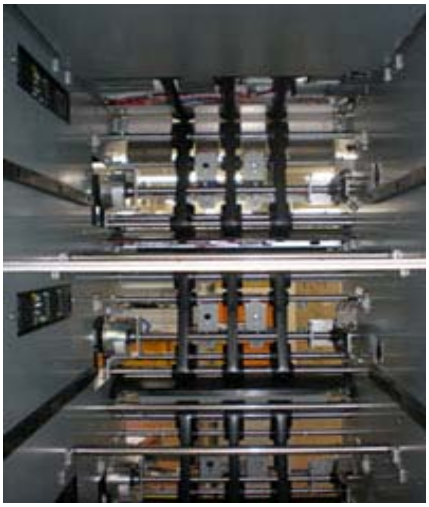




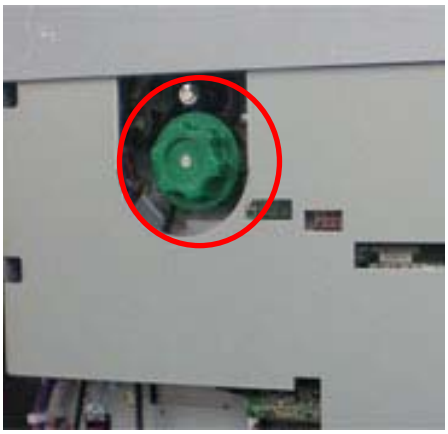


5) If jams are not found in the transport module or the temporary stacker then it will be necessary to check the cassette modules.

Hold the bottom of the cassette with one hand and take out the cassettes using handle with another hand to check the cassette modules.



6) After removing each cassette one at a time, check for jammed notes in each feed module. Also perform a quick inspection on the back exterior side, as shown in picture next to step 8.



7) Turn the green knob, located on the left side of the cash dispenser, clockwise or counterclockwise to move the jammed notes to an area where they can easily be removed.



8) Removed the jammed note carefully.

After clearing jammed notes in the cash dispenser, be sure to check one more time for any debris or bills. Then insert cassette in cash dispenser and power on the ATM.

#### 7.2.3.4 Controller Board

If the following conditions occur, replace the Controller Board.

1) When turning on the ATM power, the RxD LED in the Controller board flashes a few times but TxD LED doesn't flash at all.
2) Strange letters (eg. r,p….) appear on the 7 segments of the Controller Board
3) When having problems with communication, voltage, electromagnetic component (Motor, Solenoid, Micro-clutch), sensor, power from the Controller Board is abnormal while the cables and other components operate properly.

#### 7.2.3.5 Mechanical Adjustment

: Refer to Chapter 7.3

#### 7.2.3.6 Lubrication

: Refer to Chapter 7.4.2

#### 7.2.3.7. Cleaning

: Refer to Chapter 7.4.1

### 7.2.4 Common Occurred Problems

**1) Bill jams**

Turn off the power, pull the CDU rail to the full extent, and identify the jamming point. Bill jams occur more frequently inside the Cash cassette or areas nearby the Vertical Transportation Path, Gate solenoid, Reject box entry, and Upper Transport Path. Turn the Green Knob on the bottom right side to move the bills forward, and remove the notes by hand. If the bill does not move when turning the Knob, pull the jammed bill from the machine by hands. Make sure that the belt is not moved from its original position.

**2) Bad bill picks**

When bad bills are picked, two types of problem can occur. The first problem appears when a large number of bills in the Reject Box are diverted and the reject rate increases. This can cause bill jams in the transport path if the bad bill problem becomes serious.
The steps to follow for high reject rate are as follow.
Step 1: Check the condition of bills inside the cash cassette (see if bad bills or sticky bills exist)
Step 2: Conduct the Roller (G,P,F Roller) Cleaning inside the cash cassette.
Step 3: Replace the Cash cassette (Field Technician).
Step 4: Find out the cause of the reject, using the Diagnostic program for Depot (Depot Level), and check the bill denomination set in the CDU Main Board.
Step 5: Send the cash cassette that contains a problem to Hyosung ( Check and adjust the Pick-up Overlap).

**3) Cassette not fully inserted**

CDU cassette not complete docked

**4) Not sensing cassette and/or its type**

Not sensing reject box
Sensor pollution
Bad sensor

Refer to Chapter 7.4.1 for the cleaning methods against the sensor pollution and replacement criteria of bad sensors, and Chapter 7.5.2 for sensor replacement methods.

## 7.3 Mechanical Adjustment

When disassembling or assembling any components or assemblies in the field, it is essential to follow the proper adjustment specifications recommended by Hyosung, since this can have a critical impact on the lifespan of the component. If the adjustment is incorrect, the problem may not appear during the initial test, but the lifespan of the component can be shortened considerably. In addition, incorrect adjustment can cause such problems such as bill jams, high reject rates or note damage.

| SECTION | LOCATION DETAIL | REMARK |
|---|---|---|
| Belt tension | Drive Belts Tension of Body Module to Feed Module<br>Drive Belts Tension between Feed Modules<br>Drive Belts Tension of Upper Transport | **For both field technician and depot Level** |
| Gate Shutter | Gate Shutter Solenoid | |
| Exit Shutter | Exit Shutter Solenoid | |
| Cassette Guide | Width Guide and Height Guide | |
| Cassette Overlap | Overlap length between Feed Roller and Gate Roller | **Factory Adjustment Only** |

### 7.3.1 Belt Tension Adjustment

The objective of all belt adjustments is to remove any slack without stretching the belt. On the Feed module and body module, provision is made for the adjustment of five drive belt tensions. Loose belt tension can cause continuous frictions and abrasions between the teeth of pulley and belt, which ultimately reduces the lifespan of the belt dramatically. Therefore, it is critical to properly adjust the belt tension.

**1) Drive Belts Tension of Body Module to Feed Module**

① First, place the belt in the direction shown in the below picture, and assemble the Idle Tension Bracket at the end of the assembly process.

② Put the embossing behind the Idle Tension Bracket inside the square home, and push it in the direction of the arrow. Slightly snug the M4 screw.

③ Adjust the Idle Tension Bracket so that the belt tension at the longest belt point has the tension of about 400~600g, and tighten the screw completely. Make sure that the screw is not loose which can loosen the belt tension.

④ Slowly turn the Green Knob and double check if any belt vibration exists.

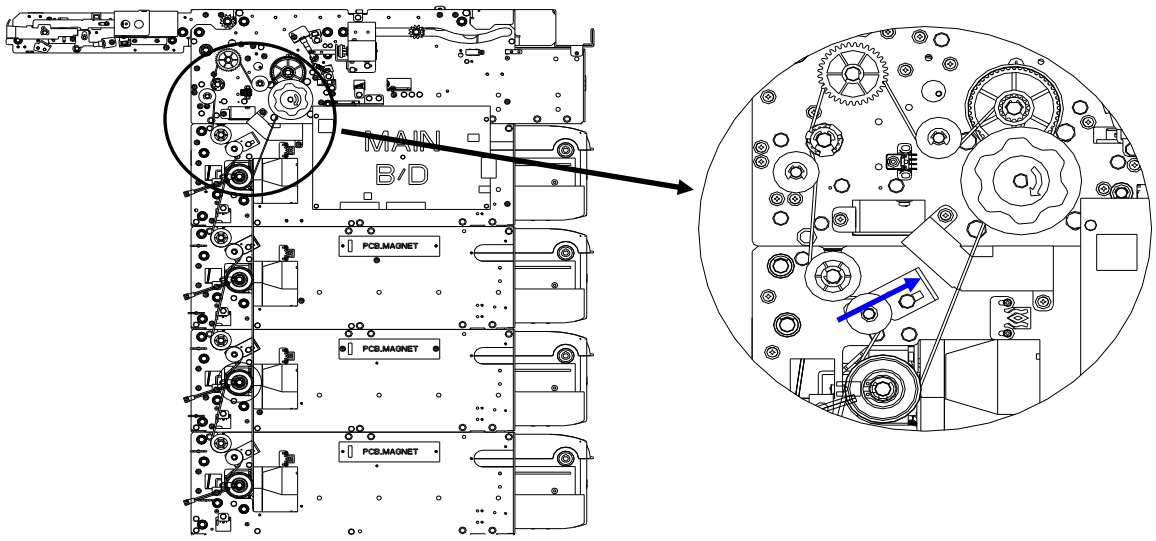



Fig. 7.5 Belt Tension Adjustment (1)

**2) Drive Belts Tension between Feed Modules (3 places)**

① First, place the belt in the direction shown in the diagram below, and assemble the Idle Tension Bracket at the end of the assembly process.

② Put the embossing behind the Idle Tension Bracket inside the square home, and push it in the direction of the arrow. Slightly snug the M4 screw.

③ Adjust the Idle Tension Bracket so that the belt tension at the longest belt point has the tension of about 400~600g and then tighten the screw completely. Make sure the screw is not loose which can loosen the belt tension.

④ Slowly turn the Green Knob and double check if any belt vibration exists.

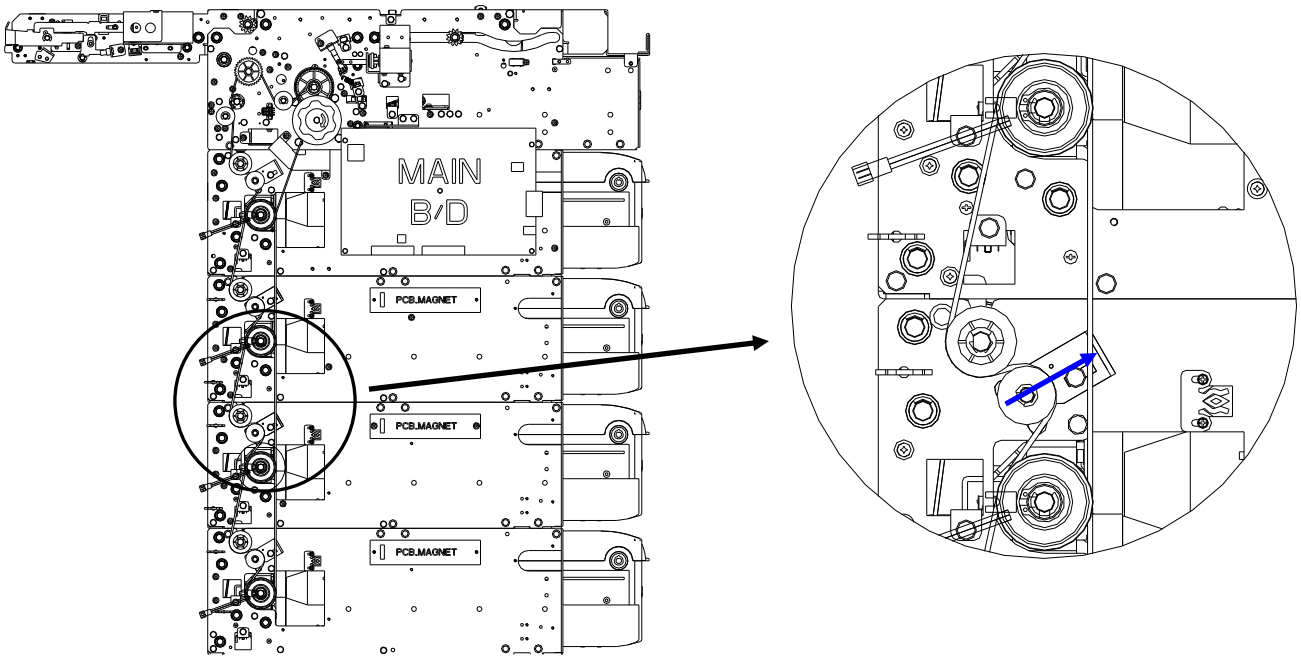



Fig. 7.6 Belt Tension Adjustment (2)

### 3) Drive Belts Tension of Upper Transport

① First, place the belt in the direction shown in the below, and assemble the Idle Tension Bracket at the end of the assembly process.

② Put the embossing behind the Idle Tension Bracket inside the square home, and push it in the direction of the arrow. Slightly snug the M4 screw.

③ Adjust the Idle Tension Bracket so that the belt tension at the longest belt point has tension of about 1.11kgf and tighten the screw completely. Make sure the screw is not loose which can loosen the belt tension.

④ Slowly turn the Green Knob and double check if any belt vibration exists.

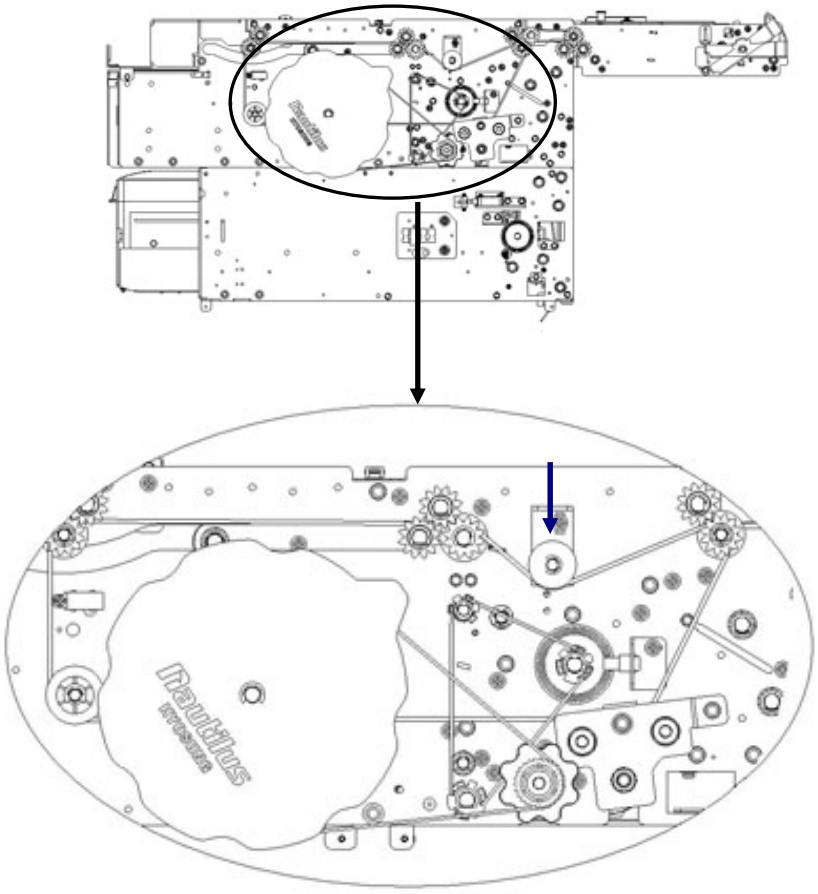


Fig. 7.7 Belt Tension Adjustment (3)

### 7.3.2 Gate Shutter Adjustment

① Loosen the solenoid M4 screw (2 places) as much as possible.

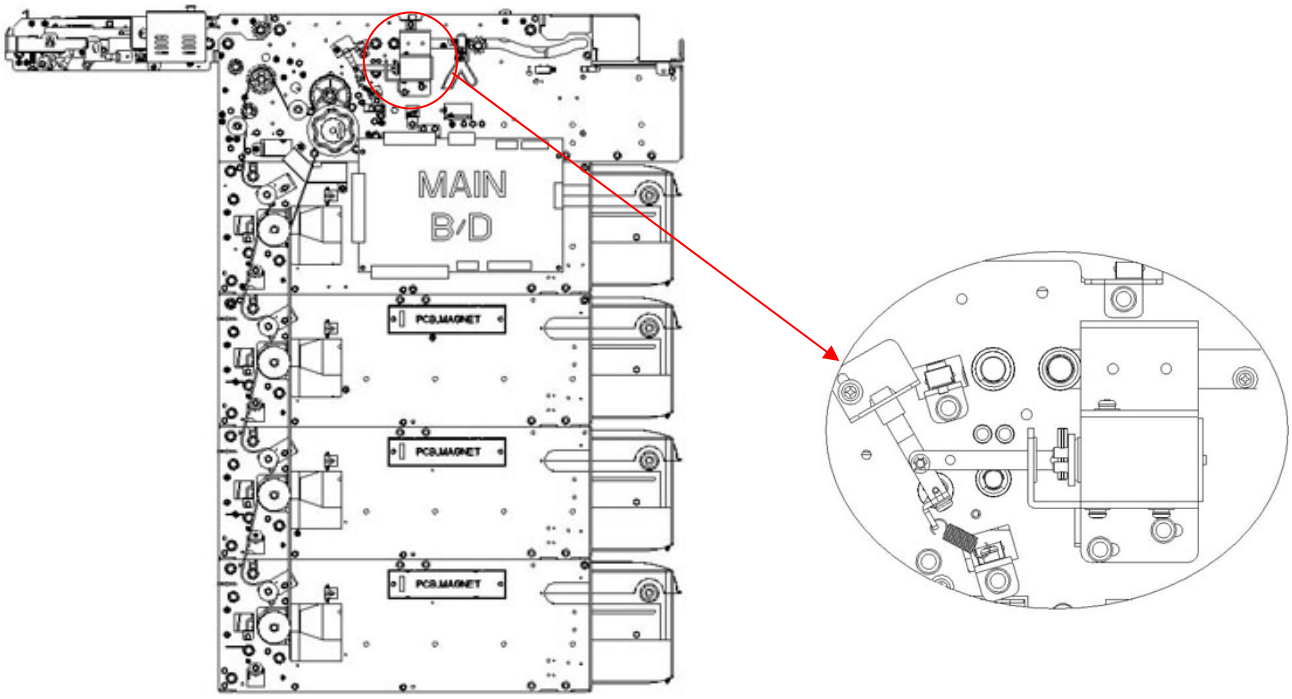
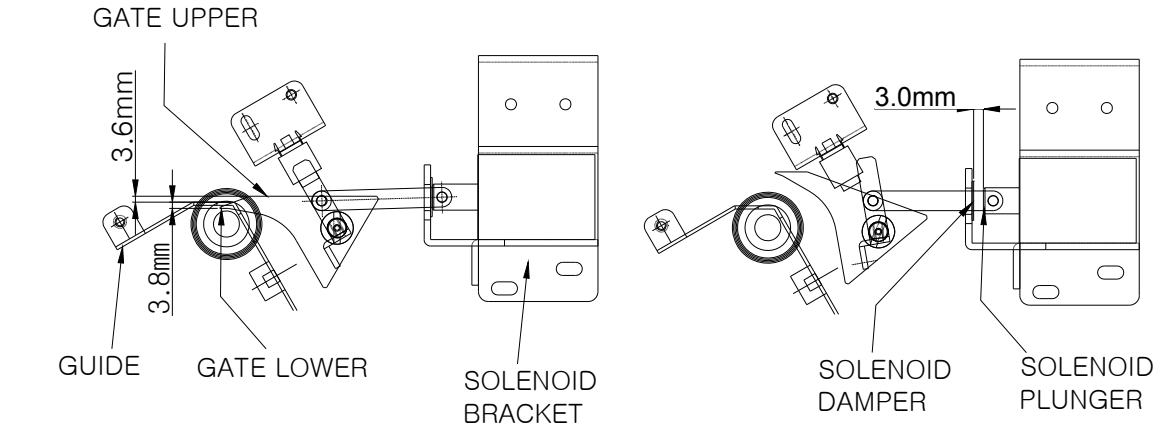



Fig. 7.8 Gate Shutter Adjustment 1

② Adjust the solenoid position so that the solenoid damper is at least 3.0mm away from the solenoid plunger when you pull the gate as shown in the below right figure

③ Adjust the solenoid bracket so that the gate upper is at least 3.6mm away from the guide as shown in the below left figure

④ Tighten the solenoid M4 screws (2 places).




When the solenoid is released

When the solenoid is pulled

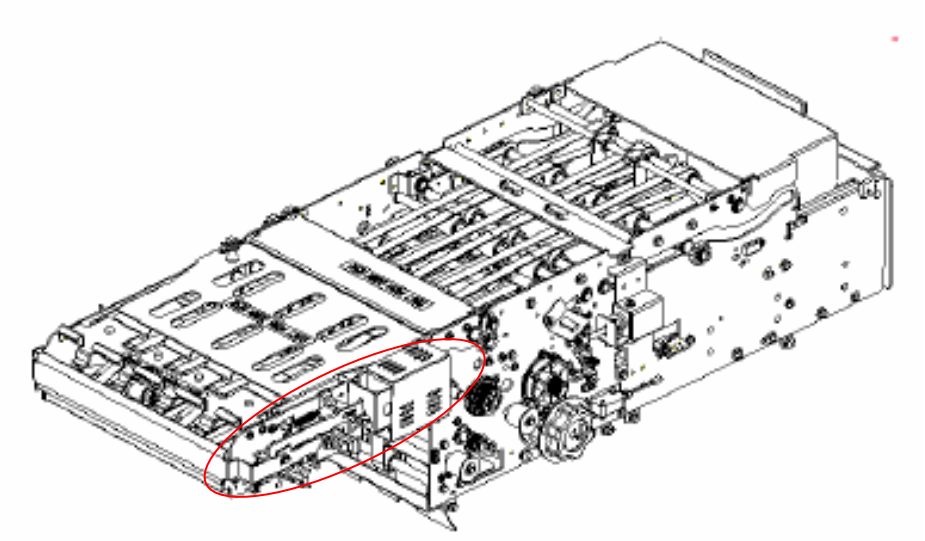
Fig. 7.9 Gate Solenoid Adjustment 2

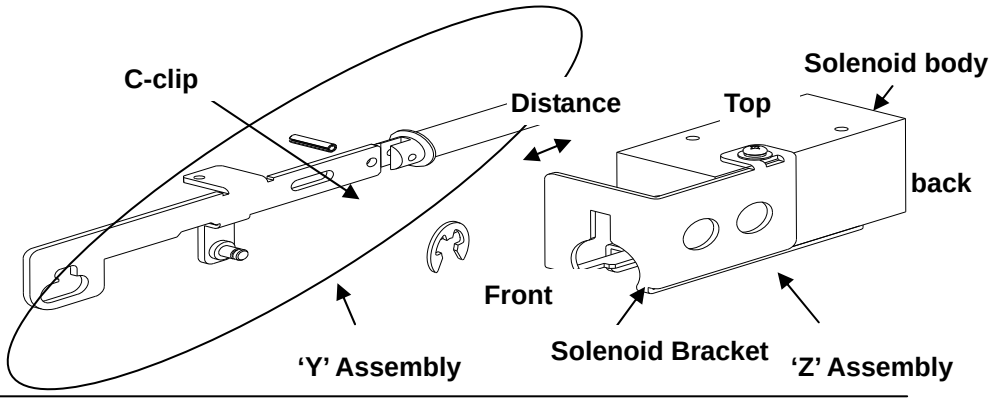
### 7.3.3 Exit Shutter Adjustment

① When joining the Solenoid Body and the Solenoid Bracket, tighten the screws at top one place and bottom two places about halfway through, and then minimize the distance between the Body and Bracket and fully fasten the screw.
② When attaching the “Z” Assembly to the FRAME, insert “Y” Assembly to “Z” Assembly, having them done horizontal with each other, and tighten the screw to the full extent.
③ Adjust the distance between Y Assembly and Z Assembly to 7.8mm from the end of Solenoid flanger C-clip to Solenoid Body.

**[WARNING!]**

**The ‘Y’ assembly value is supposed to become normal again by the spring. However, it is important to check the “alignment” because problems can occur if the Flanger of the Solenoid has not been connected horizontally.**





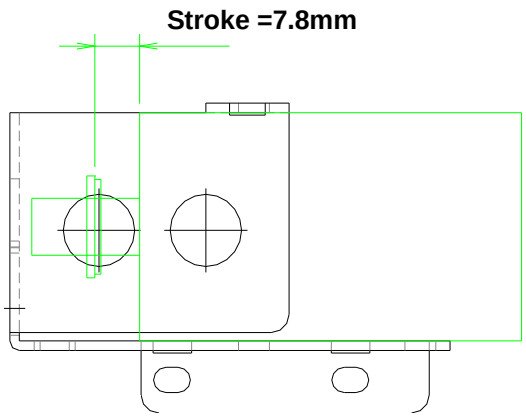



Fig. 7.10 Exit Shutter Solenoid Adjustment

## 7.3.4 Cassette Guide Adjustment for Multiple Denominations

### 7.3.4.1 The Upper Guide Setting Specification.

Use the table blow to set the note height

Table 7.1 The Upper Guide Setting Specification

| NO | NOTE HEIGHT | THE NUMBER OF SPACER | BOLT SPEC. | BOLT PART NUMBER. | THE LENGTH OF SCREW | NOTE |
|---|---|---|---|---|---|---|
| 1 | Greater than 74mm Less than 78mm | GUIDE | SCR M3*5 BLACK | 44620105 | 5mm | |
| 2 | Greater than 71mm Less than 74mm | GUIDE + SPACER 1 | SCR M3*8 BLACK | 44621304 | 8mm | |
| 3 | Greater than 68mm Less than71mm | GUIDE + SPACER 2 | SCR M3*11 BLACK | 44620106 | 11mm | |
| 4 | Less than 68mm | GUIDE + SPACER 3 | SCR M3*14 BLACK | 44621604 | 14mm | US Dollar |

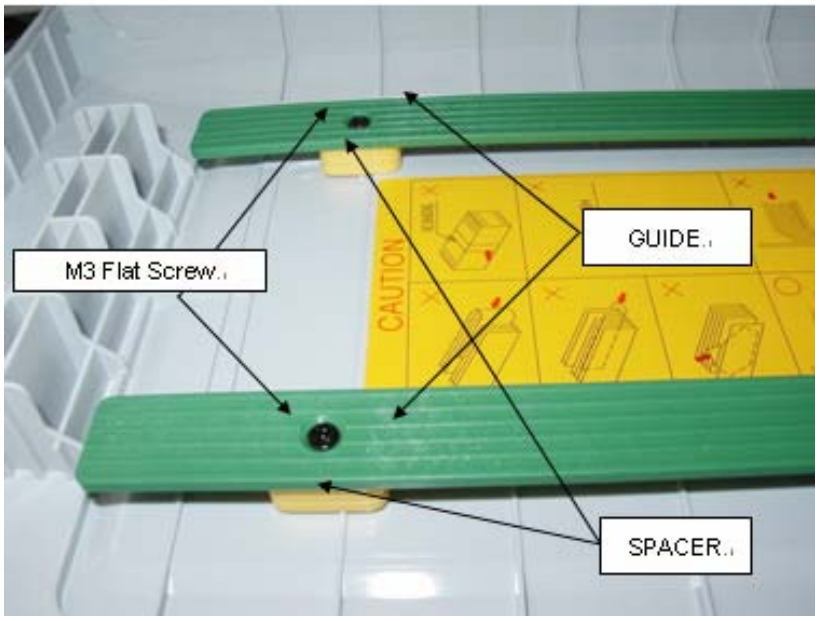


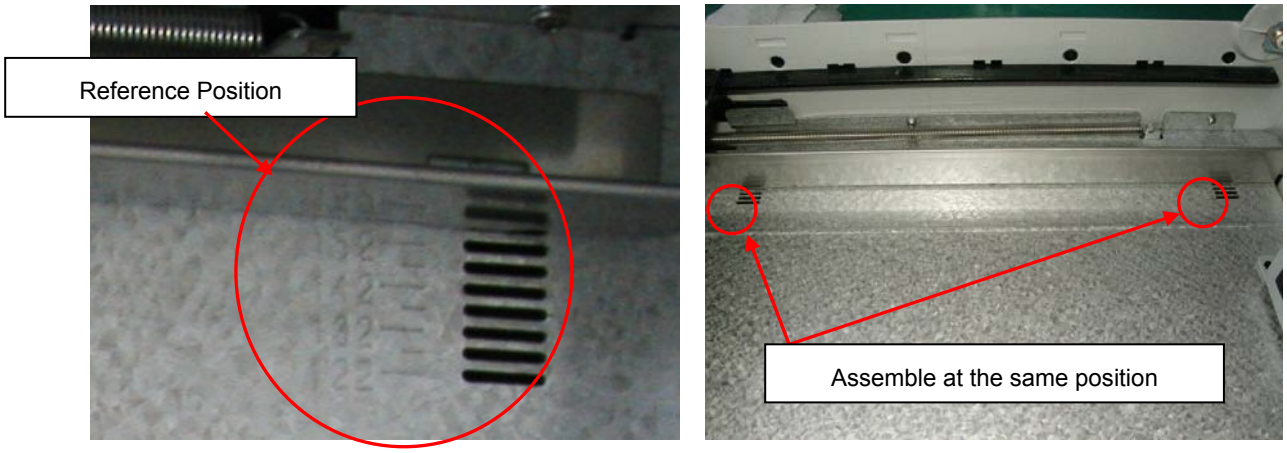

Fig. 7.11 Example of the Upper Guide Setting (Dollar-66mm)

### 7.3.4.2 The Side Guide Setting Specification.

1) Set the bill width to the reference position according to the width of the note to be dispensed.

Table 7.2 The Side Guide Setting Position

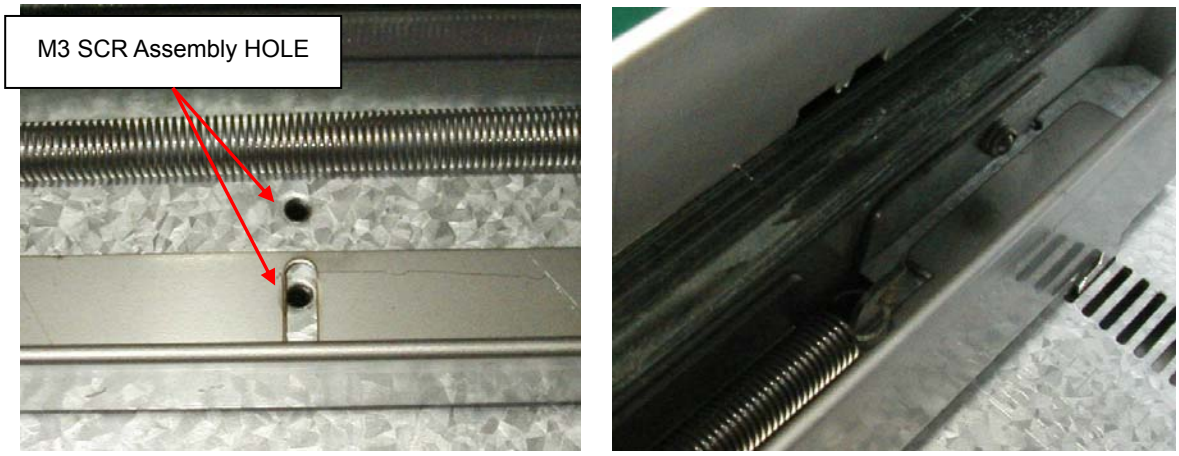
| NO. | BILL WIDTH | REFERENCE POSITION | NOTE |
|---|---|---|---|
| 1 | Less than 122mm | 122 | |
| 2 | Greater than 122mm ~ Less than 127mm | 127 | |
| 3 | Greater than 127mm~Less than 132mm | 132 | |
| 4 | Greater than 132mm~Less than 137mm | 137 | |
| 5 | Greater than 137mm~Less than 142mm | 142 | |
| 6 | Greater than 142mm~Less than 147mm | 147 | |
| 7 | Greater than 147mm~Less than 152mm | 152 | |
| 8 | Greater than 152mm~Less than 157mm | 157 | US Dollar |
| 9 | Greater than 157mm~Less than 162mm | 162 | |
| 10 | Greater than 162mm~Less than 167mm | 167 | |




(A) (B)

Fig. 7.12

2) Put the hook parts of Side Guide into the holes of the Guide Assembly Position, and then push it toward the pick-up assembly until you can see the screw hole. (Fig. 7.13(A))
In case the bill width is greater than 150mm,
: Put the Side Guide under the Push-Spring and then insert the hook parts into the holes of Guide Assembly Position – Fig. 7.13(B))




(A) (B)

Fig. 7.13

3) Assemble the SCR:PH(+):S/W:F/W(L):M3*6:W/Zn in the M3 Screw Assembly Hole



Fig. 7.14

# 7.4 Preventive Maintenance

## 7.4.1 Cleaning

In order to prevent problems caused by sensor pollution and pick errors, the Sensor and Roller should be cleaned hopefully. The cycle of the cleaning varies depending on the function, location, and degree of pollution of the component.

| NO. | LOCATION | | INT. | REMARK |
|---|---|---|---|---|
| 1 | Body and Feed Module in Cash dispenser | All Senosr (CS11(A,B)D,T / CS21(A,B)D,T CS31(A,B)D,T / CS41(A,B)D,T / CS14D,T / CS3 / CS8 CS19 / CS29 / CS39 / CS49 CS17 / CS27 / CS37 / CS47 CS2 / CS9D / CS16 / CS26 CS36 / CS46 / CS15 / CS6 CS18 / CS28 / CS38 / CS48 CS12 / CS 22 / CS32 / CS42) | R.C<br><br>M3 or 20,000 Transaction | Remove debris and dusts using soft brush, air blower and air can |
| 3 | Pick up Module in Cassette | Pick-up Roller<br>Feed Roller<br>Gate Roller | M3 | Remove any contaminations and dusts using the soft brush, Q-tip with alcohol |
| 4 | | Rubber of Pick-up Roller | M12 or 80,000 transaction | Replace only rubber of Pick-up Roller with new one |

※ R.C : Repair Call M3 : Once every 3 months M12 : Once every 12 months

Along with the main body of the CDU, any currency cassette being used in the unit will have to be maintained and handled with the same importance; because of the picking mechanism built into them.

The CDU does not require much lubrication at all; the main key is to keep all sensors free of dust or any debris. There are some micro switches which require position adjustment only.
Most of the sensors are composed of two components; the transmitter and receiver. One component is facing downwards and the other is facing upwards, the component that's facing upward have the

tendency of collecting more dust or debris and should be inspected more closely.

#### 7.4.1.1 Description of CDU Sensors and Locations

| Labeled Sensor | Functionality |
|---|---|
| CS 17,27,37,47 | Cassette Position Sensor |
| CS 12,22,32,42 | Cassette ID Sensor |
| CS 16,26,36,46 | Cash Low Sensor |
| CS 18,28,38,48 | Cassette Empty Detection |
| CS 2 | Retract / Reject Bin Present |
| CS 9 | Retract Bin Area Full |
| CS1 | Reject Bin Area Full |
| CS 8 | Main Motor Encoder Sensor, checks speed of the motor |
| CS 19,29,39,49 | Clutch Encoder Sensor, cassette internal jam |
| CS 11,21,31,41 | External cassette Jam (bill skewing, bill length and Bill spacing) |
| CS5 | Double Detect sensors |
| CS 4 | Informs CS3 if picked bill(s) passed double, length skew, bill speed and some other tests prior to dispense. |
| CS 3 | Gate Operation Sensor |
| CS 6,7 | CAM Detection Sensor |
| CS 10,13 and 14 | Main Body / transport sensors |
| CS15 | Exit sensor |
| STS1 / STS2 | Gate/Shutter Sensors |
| Docking Switch | GCDU Docked / Undock |

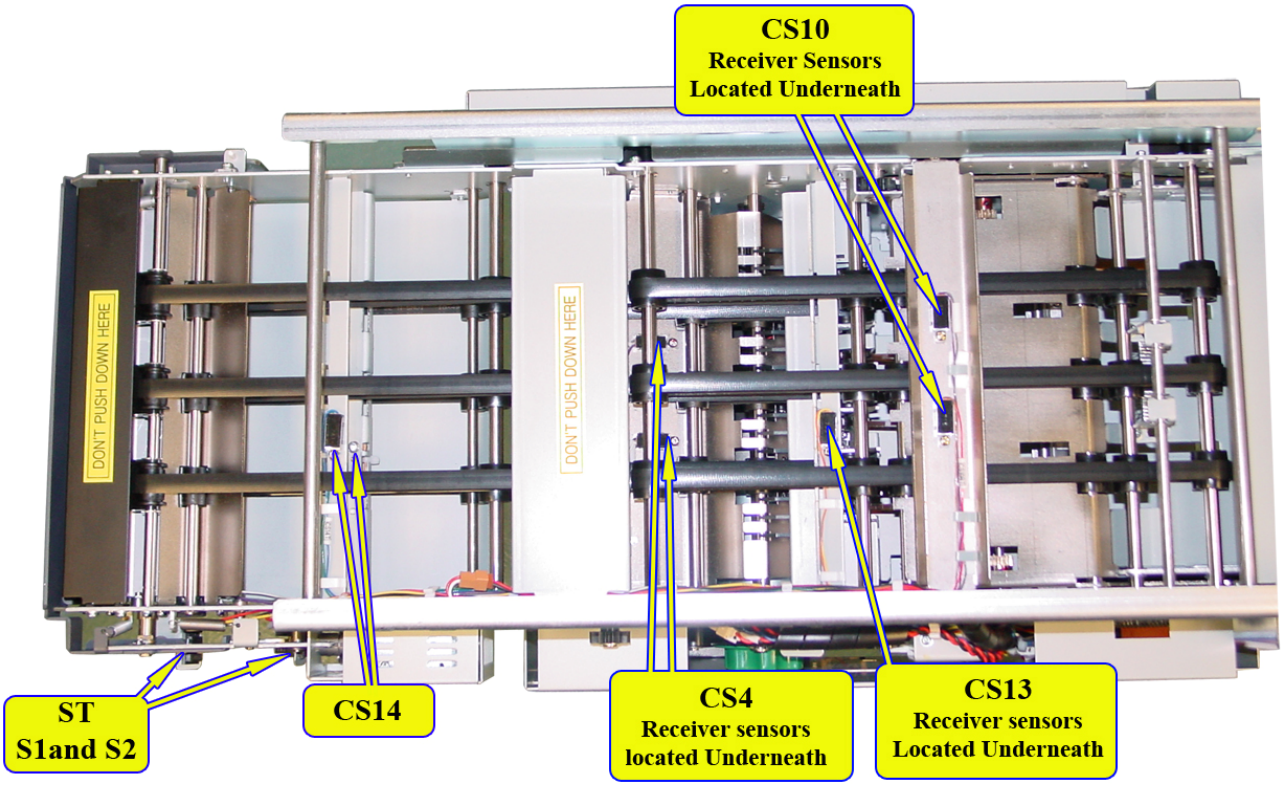



Fig. 7.15 Top View

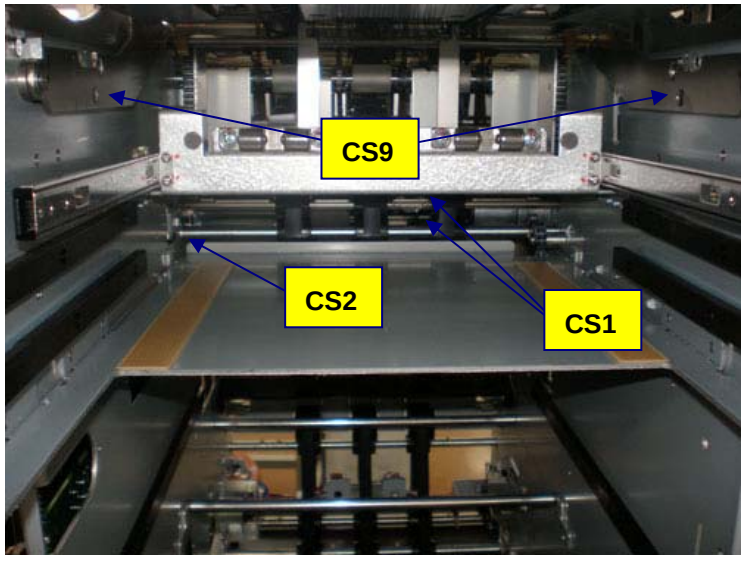



Fig. 7.16 Retract / Reject Bin Area

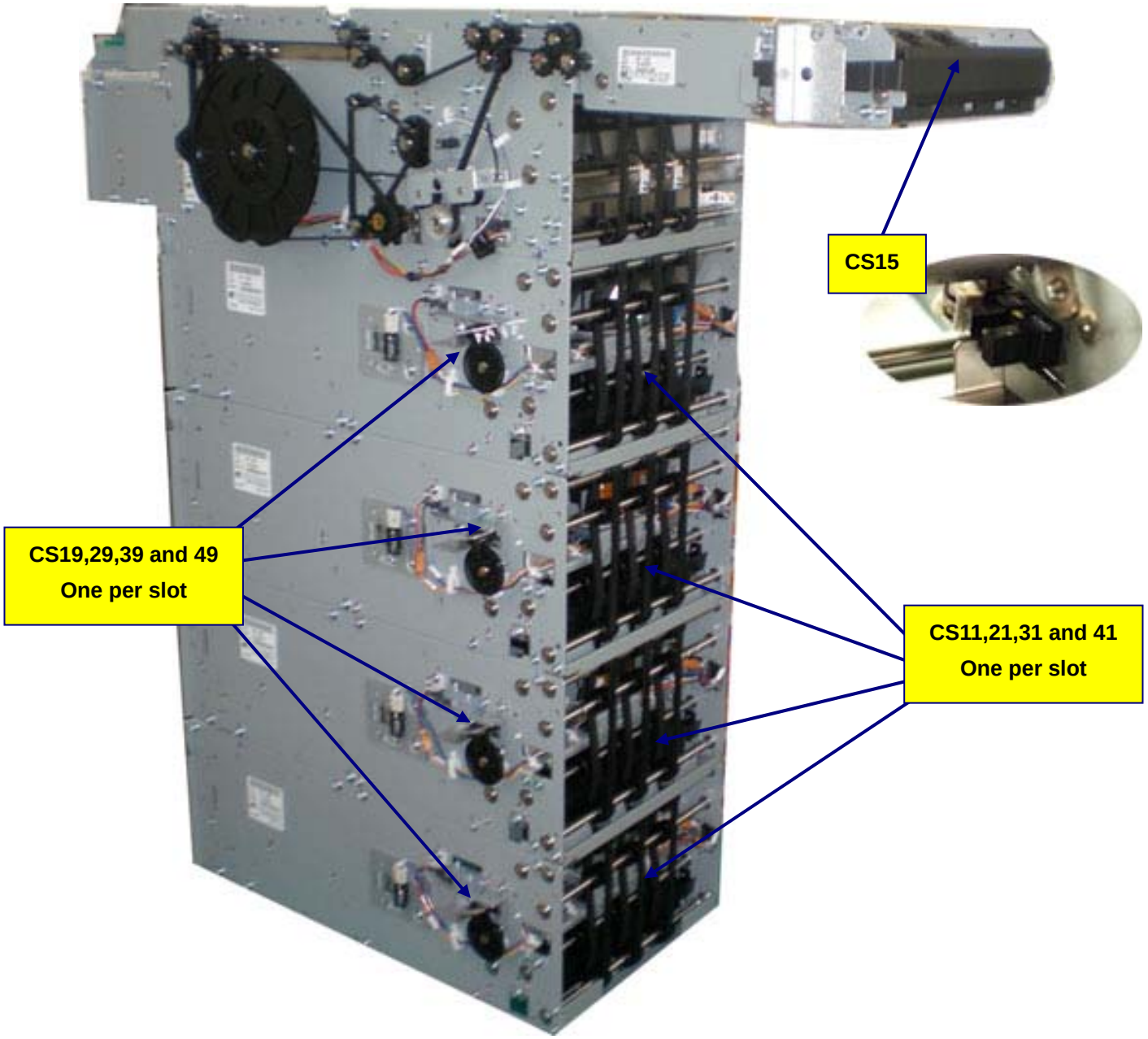



Fig. 7.17 Transport Area

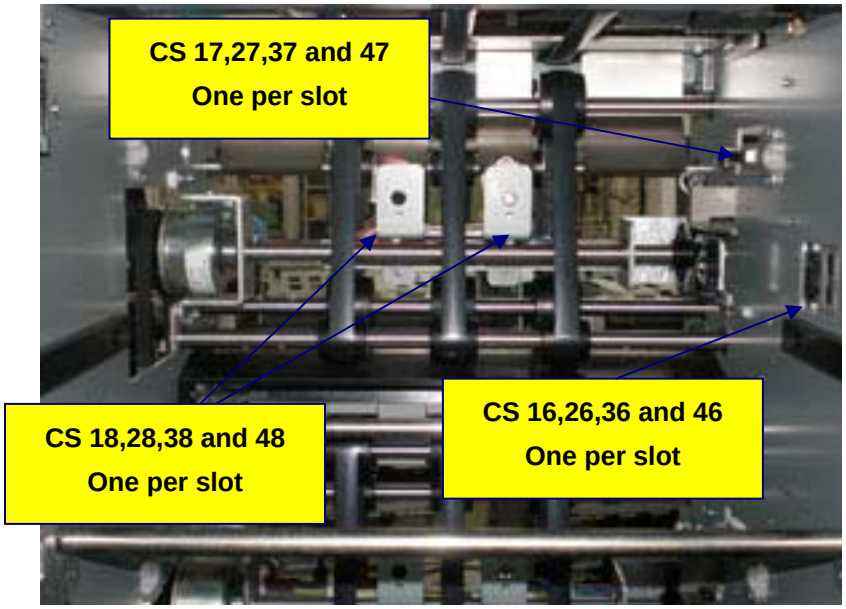



Fig. 7.18 Pick Module Cassette Slot




Fig. 7.19 Double Detect Metal Rollers

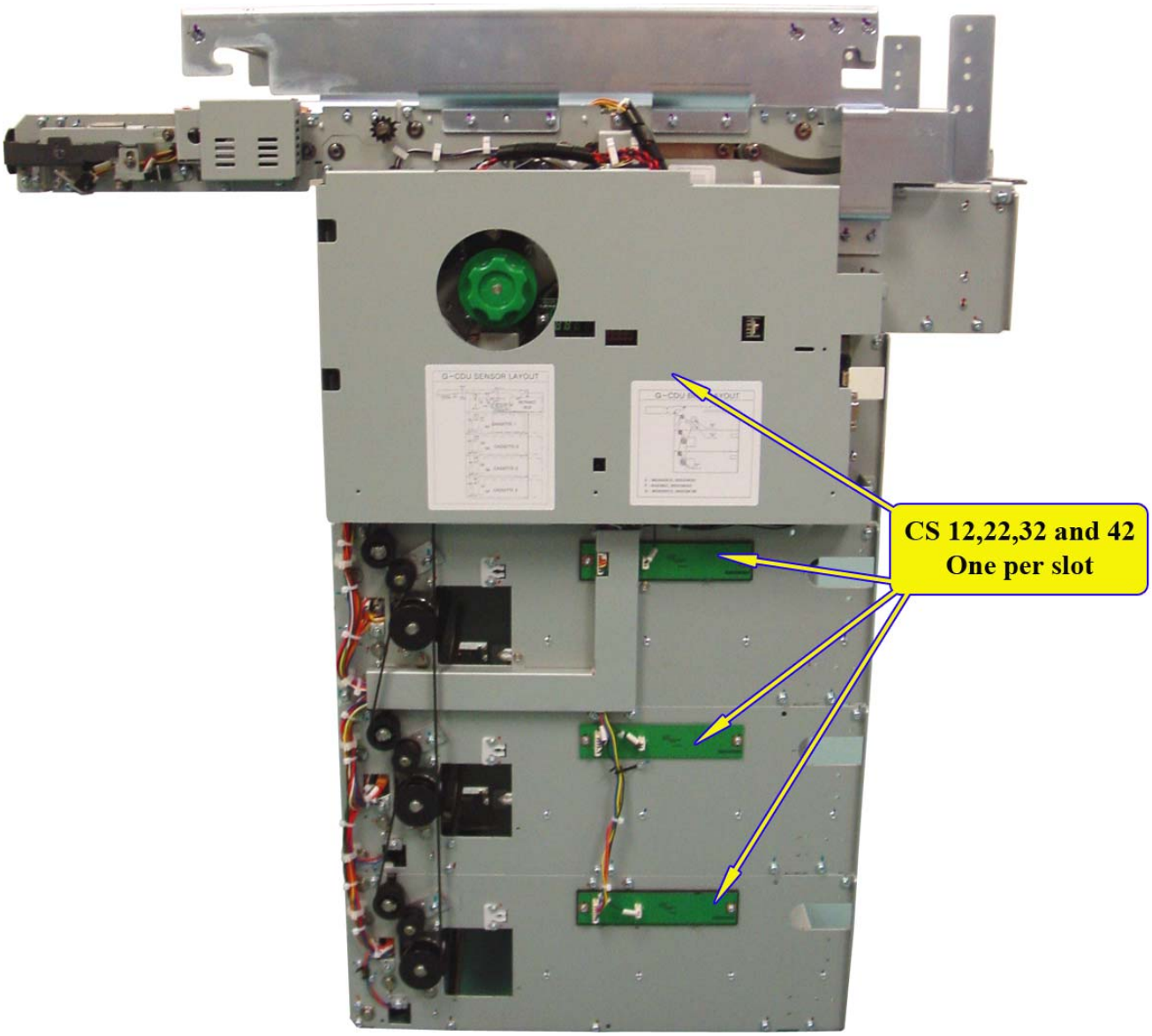



Fig. 7.20 Cassette ID Boards

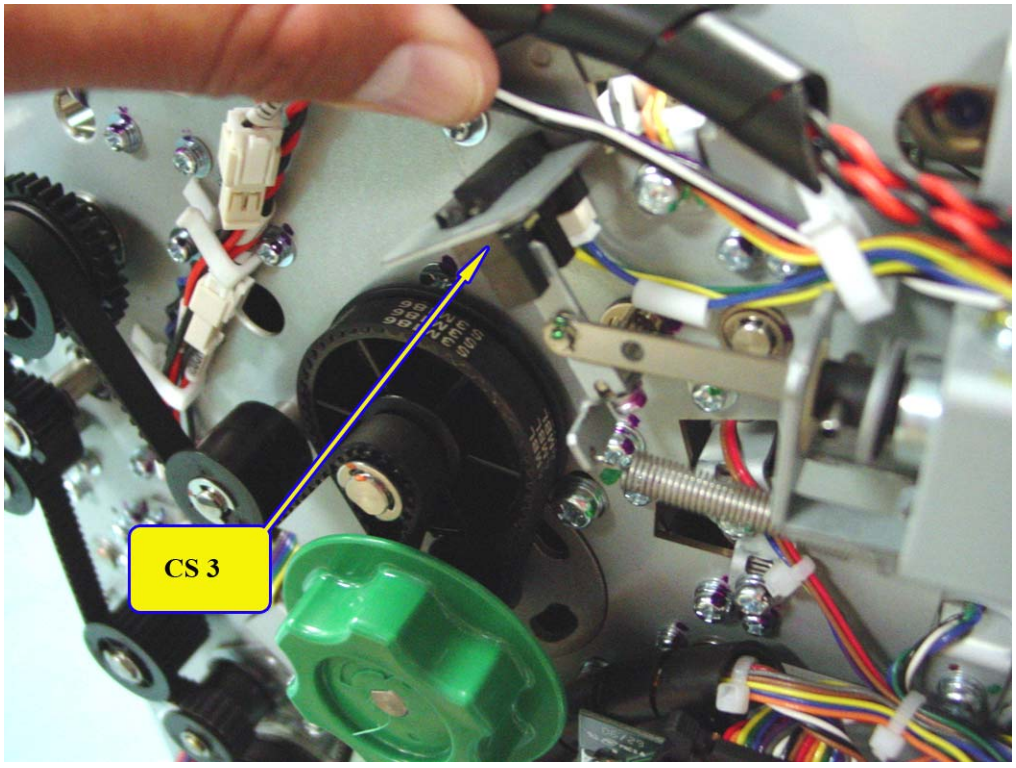



Fig. 7.21 Operation gate sensor

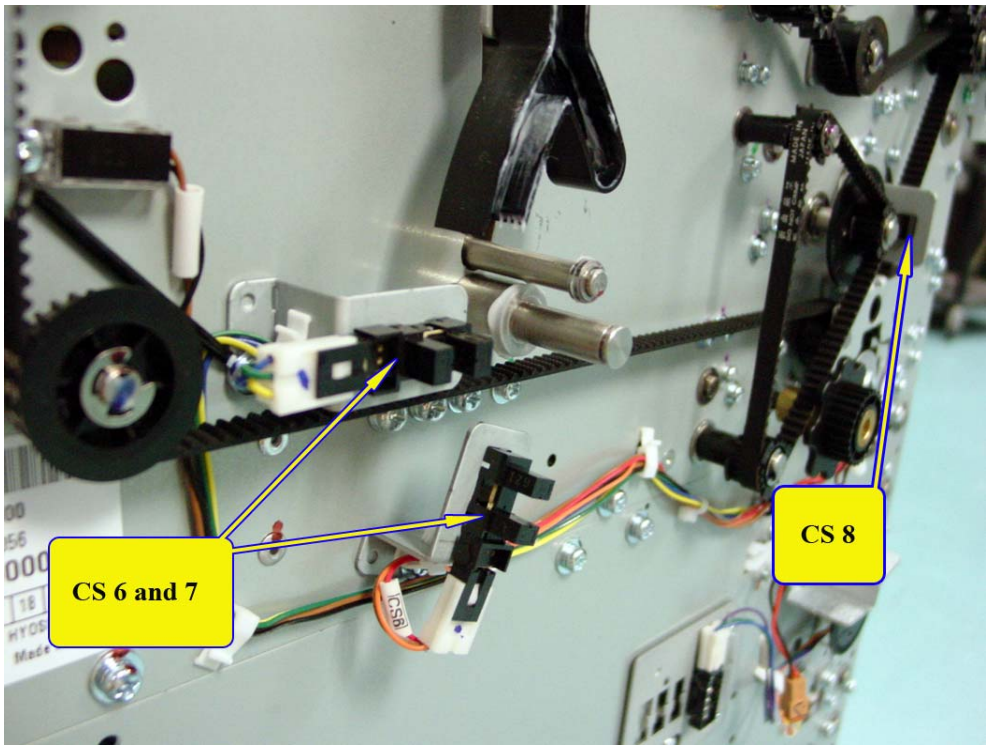



Fig. 7.22 CAM sensor areas

#### 7.4.1.2 CDU PM (Preventative Maintenance) During Repair Calls

After you have made your CDU repairs, perform the following steps.

1) Remove all accumulations of dust and paper residue from the unit using a brush P/N 6014559 and cleaning rag; any debris left may be blown away using canned air. Make sure that you clean the surfaces of every sensor on the CDU by using foam or cotton tips, any cracked or broken sensor must be replaced.

2) If double detect metal rollers are accumulating dirt, clean them with chem. pad P/N 6001593. CHEM PADS ARE NOT TO BE USED ON ANY OTHER AREA/COMPONENT. Refer to figure 7.19.

3) Using canned air blowout any dust accumulation or paper residue from the purge bin and all cassettes (including spare cassettes) both inside and outside, paying particular attention to the front door of the cassettes, which contains the picking mechanism assembly.

4) Ensure that all transport belts are in the correct pulley positioning. If belts continuously come out of place, this is a good indication of wear and module needs to be replaced.

5) Ensure that all motor driver belts have sufficient belt tension.

6) After you repaired and performed your PM, it is imperative that you run diagnostics. Unit must be fully tested and when exiting diagnostics the enhanced controller will initialize, forcing the CDU controller board to re-calibrate the top sensors of the main body module (CS4, CS10A, CS10B, CS13 and CS14).

7) Fill Out ATM Repair Log Sheet

### 7.4.1.3 CDU PM Every 3 Months or 20,000 Transactions

1) Perform steps 1 – 9 of CDU Preventative Maintenance during repair calls.

2) If the interior of the safe appears to be dusty/dirty, it is imperative that you clean this area as well, if not all dust and dirt will fall back on the CDU that you previously cleaned.

**[NOTE!]** DO NOT USE ALCOHOL TO CLEAN ANY BELTS. If belts need to be cleaned use a damp rag (WATER) and wipe off any dirt accumulated on the belts.

3) Inspect cassette pick roller rubbers. You may inspect these rollers by giving them a quick physical inspection without taking the cassette apart. By referring to figure 9 and 10, you will see a new pick roller compare to a degraded roller. These images will help you determine how a roller starts wearing out. Though the roller in figure 10 is still functional, you can see the wear developing. Figure 10's roller was in the field 6 months; we expect rollers to last at least 1 year before needing replacement. Refer to figure 7.25 for a closer look at the old roller.

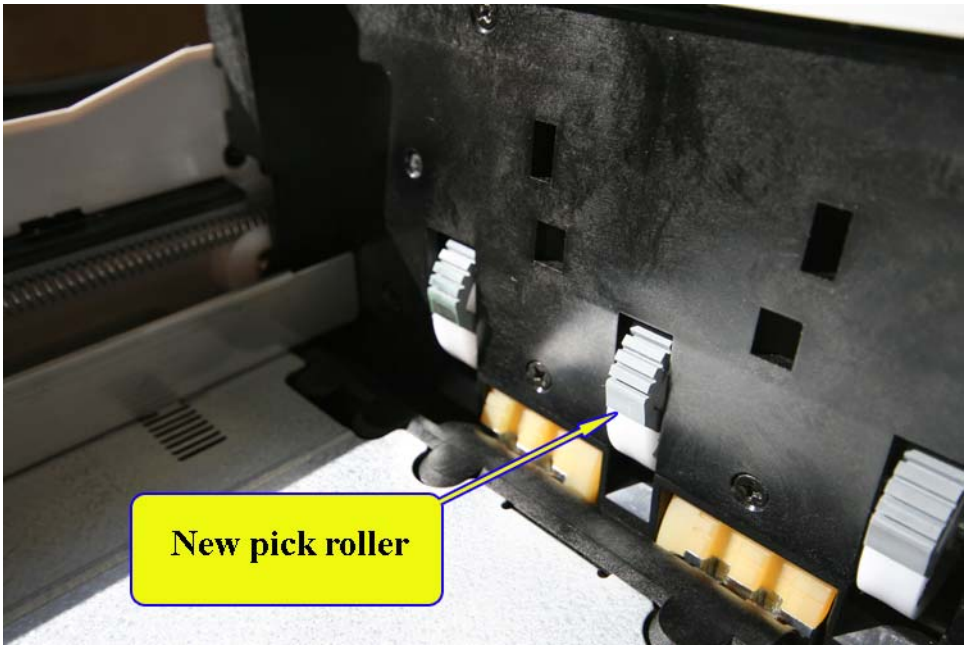



Fig. 7.23

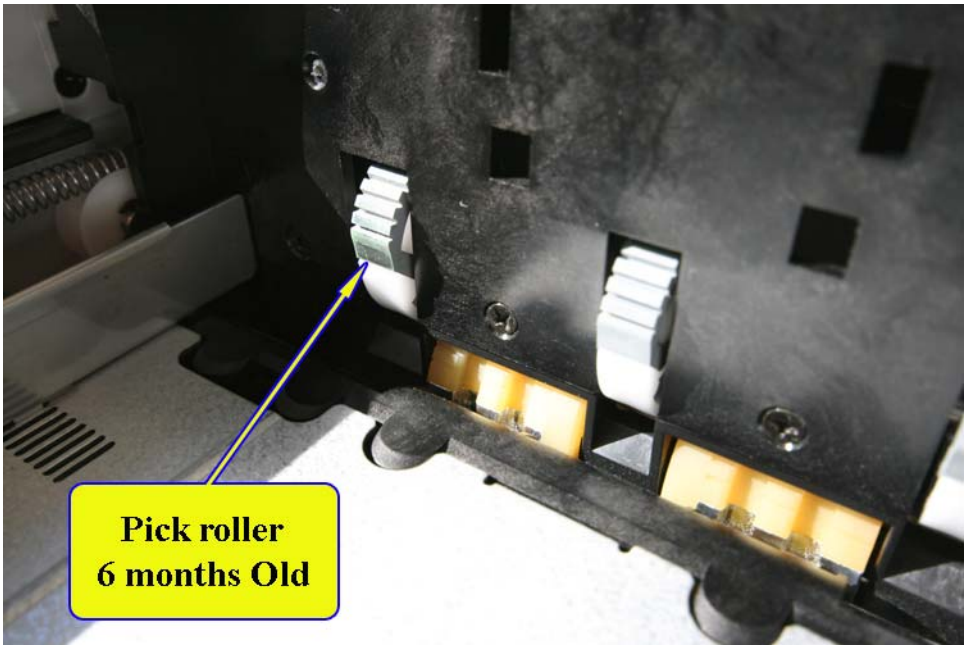



Fig. 7.24



Fig. 7.25

### 7.4.1.4 CDU PM Every 12 Months or 80,000 Transactions

1) Perform preventative maintenance of CDU repair calls and every 3 months procedures.

2) Mandatory, Cassette pick roller rubbers **MUST BE REPLACED**. Support engineering recommends the replacing of these component every year or 80,000 transactions.

The following are instructions how to replace the pick rubber rollers.

A) Cassette Pick up Mechanism and Pick Roller Rubber Replacement
Open cassette cover and pull back the push plate to lock.

B) Loosen up both screws securing the bottom of the pick up mechanism and remove both gold plated screws securing the top assembly, for location of these screws refer to figure 7.26.

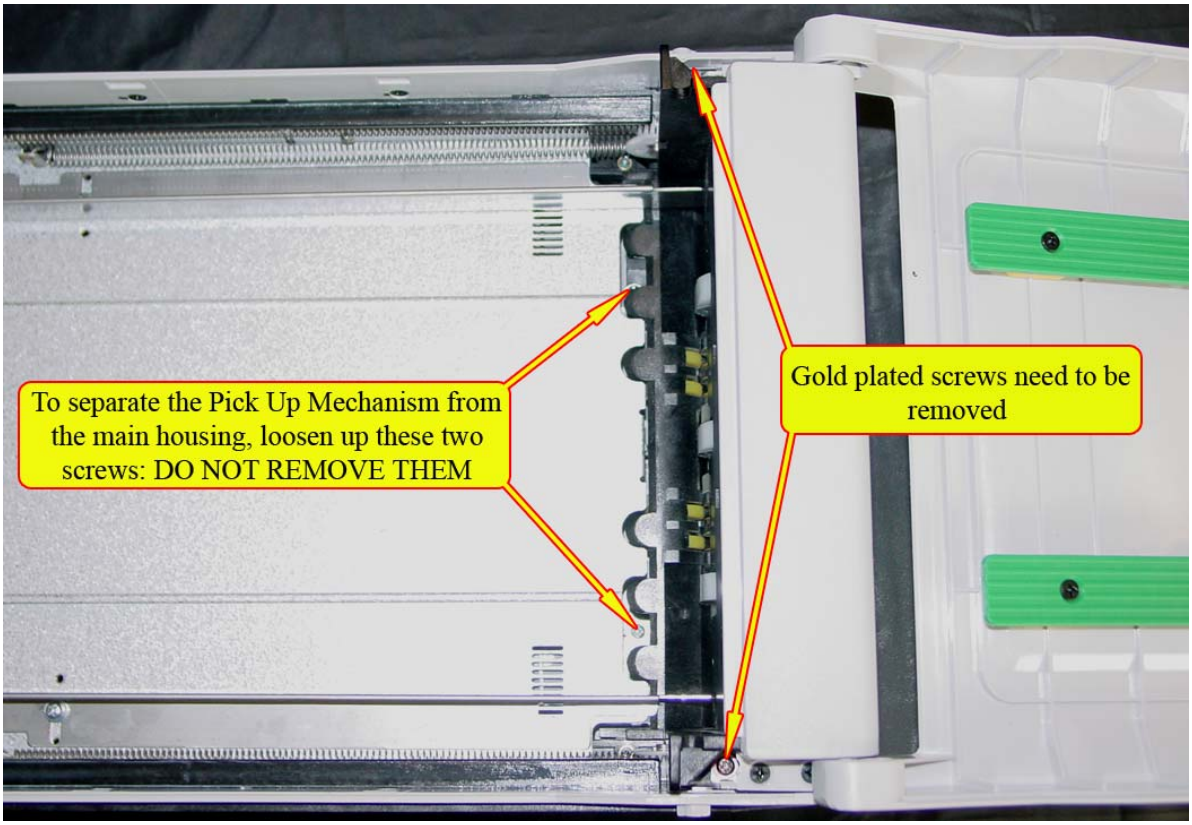

To separate the Pick Up Mechanism from the main housing, loosen up these two screws: DO NOT REMOVE THEM
Gold plated screws need to be removed

Fig. 7.26

C) Using your elliptical screwdriver remove both ellipse head screws from the rear bottom side of the cassette. Refer to figure 7.27.

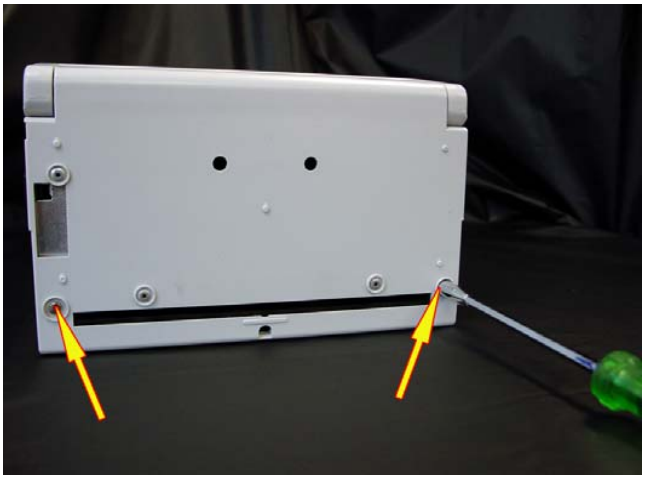
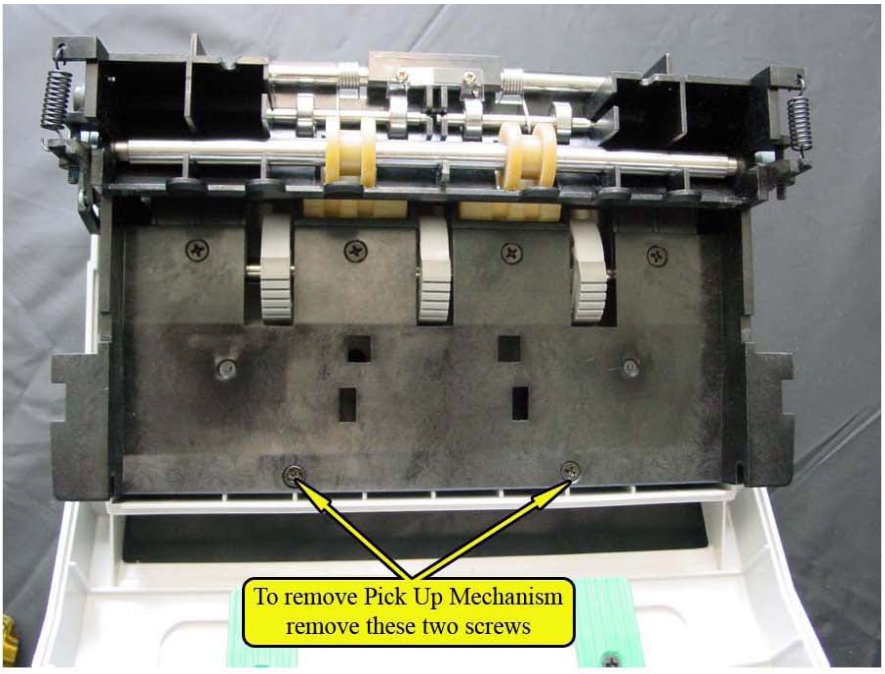


Fig. 7.27

D) Remove both screws and lift upwards the cassette pick up mechanism from rear/top cover. Refer to figure 7.28.

E) Pick Roller rubbers must be replaced every year or 80,000 transactions (P/N 6014809). We recommend replacing these rollers if they appear to be worn out due to excessive usage and if the cassette is experiencing excessive pick failures. After main pick up mechanism assembly has been removed, you may rotate the picking rollers until you have full access to the rubber rollers, replace each roller at a time by slide them out of their roller housing. Refer to figure 7.29.



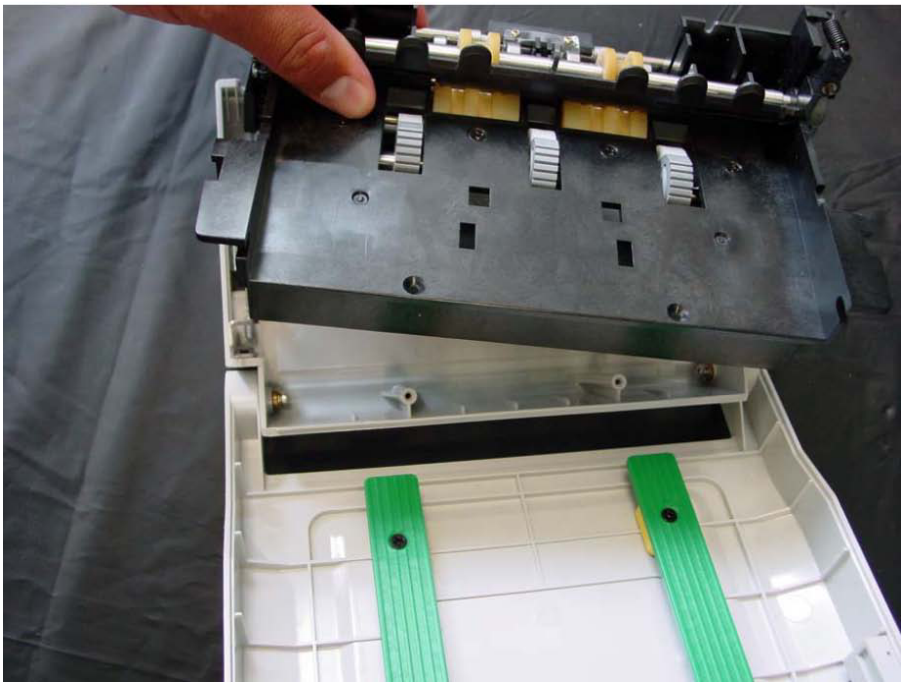



Fig. 7.28

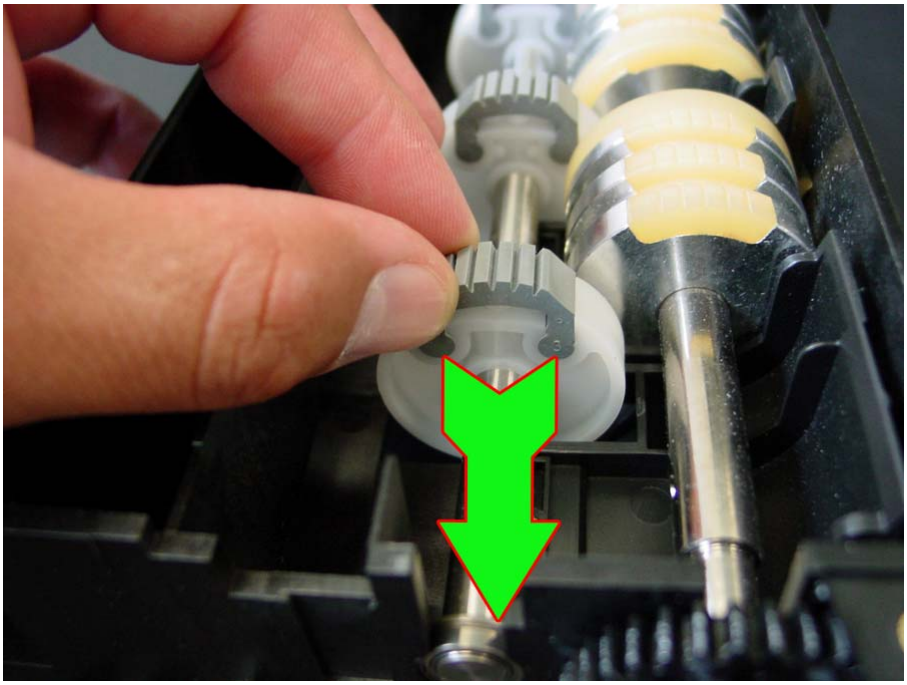


Fig. 7.29 Pick rollers are included in the CDU Spare Part Kit P/N 6015075

F) Reassemble by reversing the disassembly procedure.

3) Reminder: After you repaired and performed your PM, it is imperative that you run diagnostics. Unit must be fully tested and by going out of diagnostics the enhanced controller will initialize forcing the CDU controller board to re-adjust the top sensors of the main body module (CS4, CS10A, CS10B, CS13 and CS14).

### 7.4.2 Lubrication

- Check the oiling status before running or storing it. In case there is any part lack of lubricant, apply lubricant to the corresponding part in compliance with oiling standard.
- Apply grease only if necessary during the regular field inspection. In case there is enough lubricant, do not apply additional lubricant. However, if lubricant is contaminated, remove alien substances from lubricant before applying it to the machine.
- All pivot points and frictions parts must be oiled.
- All points except the following must be oiled:
  Printing head, Magnetic head, Package, Micro switch contact, Drive roller, Timing pulley, and Timing belt
- All oiling operations must be based on oil drop unit. However, when contact between the oiling device and the oiling target is not avoidable, the contact time must not exceed one second.

**[NOTE!]**

- Lubricant must not leak. In other words, lubricant must be applied only to the parts that need oiling. Do not apply excessive lubricant. Lubricant must not contaminate other parts. **Be careful that the micro switch, the sensor, the timing pulley, the timing belt, the package, the printing head, and the magnetic head are protected from lubricant.**
- Do not clean plastic parts or protection devices with alcohol and other agents than the designated one.
- Remove dust, oil, and grease from the machine, and clean the machine with dry soft cloth.
- Be careful that the paper contact part in the paper path is protected from lubricant.

Support engineering recommends that the CDU gets lubricated every year; all lubrication points illustrated must be checked and lubricated if necessary. Before you apply any type of lubricant it is imperative to wipe off any of the old lubricant left on the machine. The GCDU does not require much lubrication, there are two types of lubricants designated to be used in this machine and they should be applied on specific locations illustrated on below images.

| Description | Citibank P/N | Represented with Letter |
|---|---|---|
| Lubricants: Mobil (1) Oil | P/N 6015289<br>Material Safety Data Sheet available in Engineering WEB site. | **"A"** |
| Albania Grease EP1 | P/N 6015288<br>Material Safety Data Sheet available in Engineering WEB site. | **"B"** |

**[NOTE!]**

Greasing: When applying grease, it is Crucial to clean and apply a very light amount on designated areas, especially gears.

Oiling: it's also imperative to clean components first and then apply a very light amount of oil between the shaft and pulleys.

**- ANY AREA NOT SPECIFIED IN THIS DOCUMENT, DOES NOT REQUIRE LUBRICATION.**

**MAKE SURE ANY BELTS IN THE GCDU ARE "NOT" CONTAMINATED WITH ANY LUBRICANTS. THIS MAY CAUSE BELTS TO CRACK AND BE TORN.**

Review figures 7.30 – 41 for lubricant types and locations where to be applied.

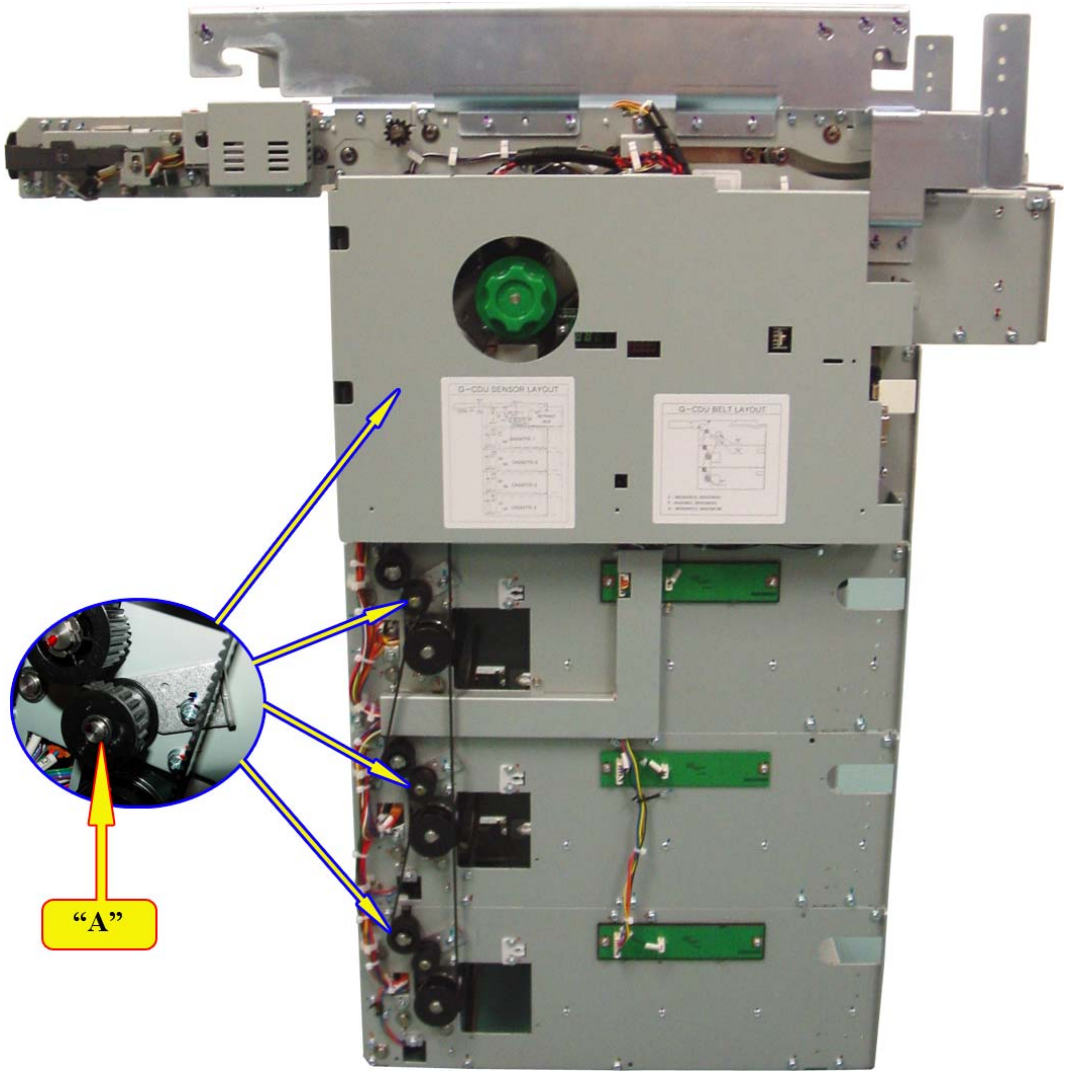



Fig. 7.30 Belt Tension Pulleys

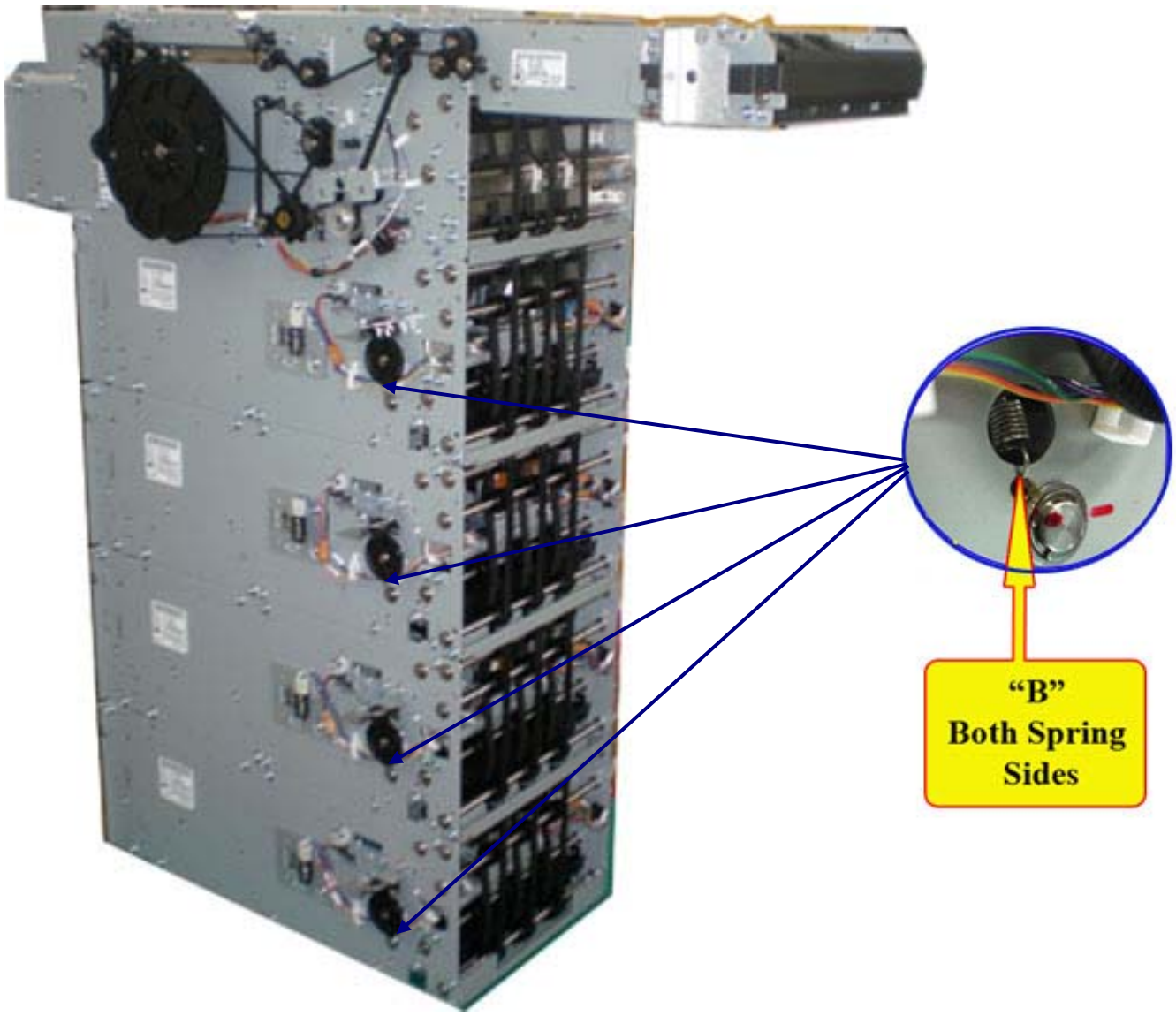



Fig. 7.31 Gate Support Spring Hook

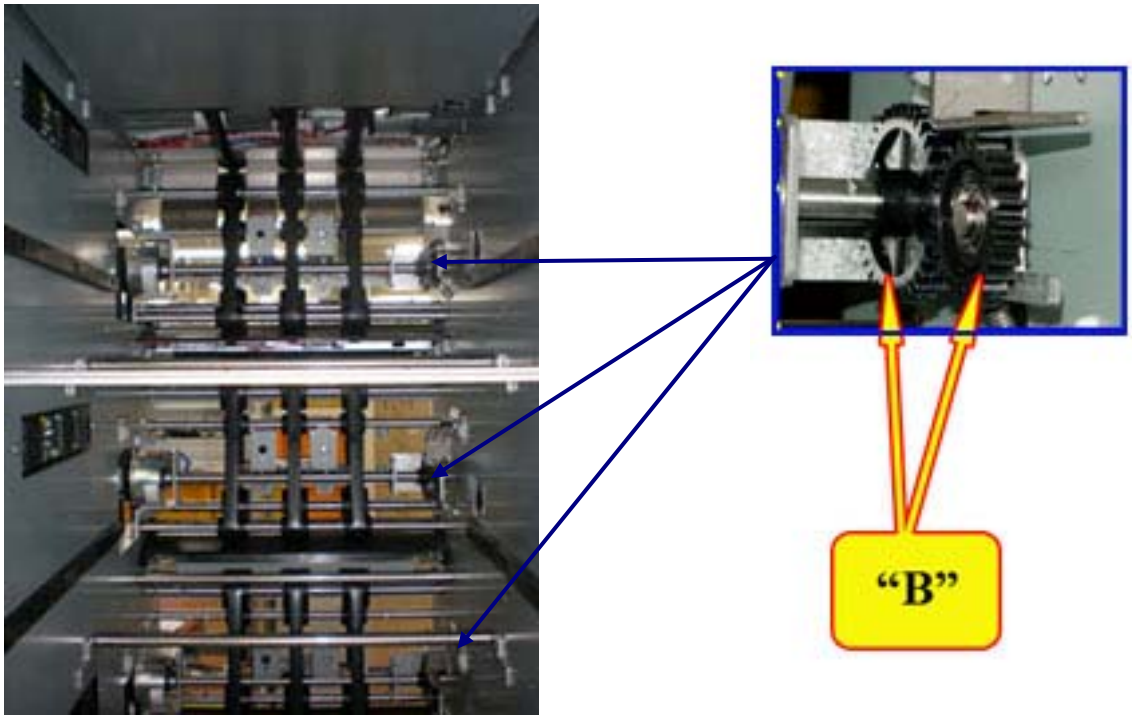



Fig. 7.32 Clutch / Cassette engagement Gears

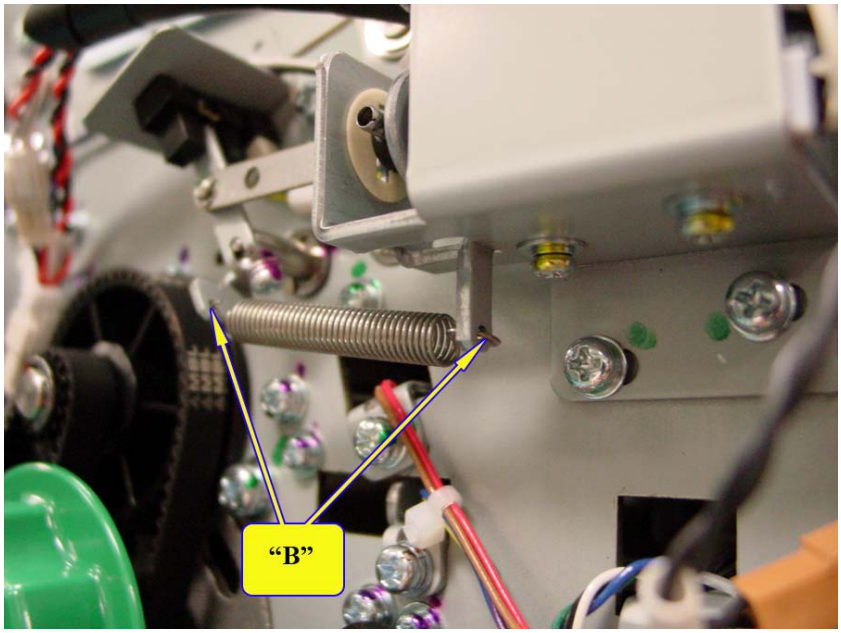



Fig. 7.33 Main Body Gate Spring Hook

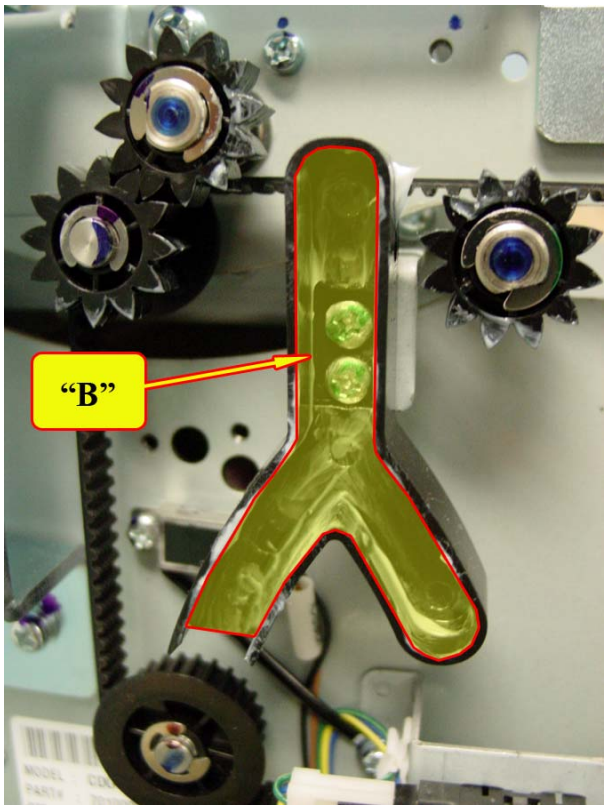



Fig. 7.34 CAM Gear Area

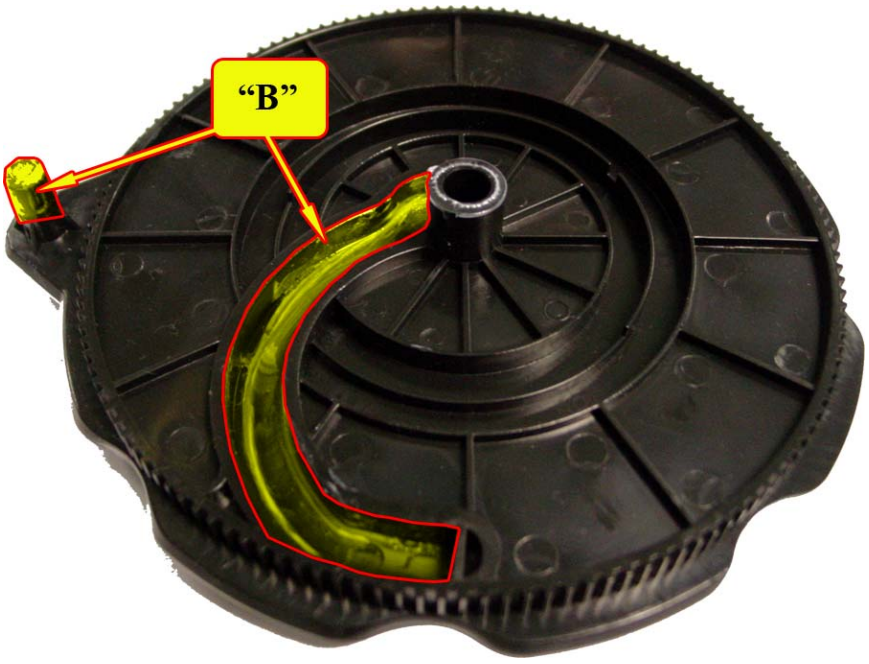



Fig. 7.35 CAM Gear

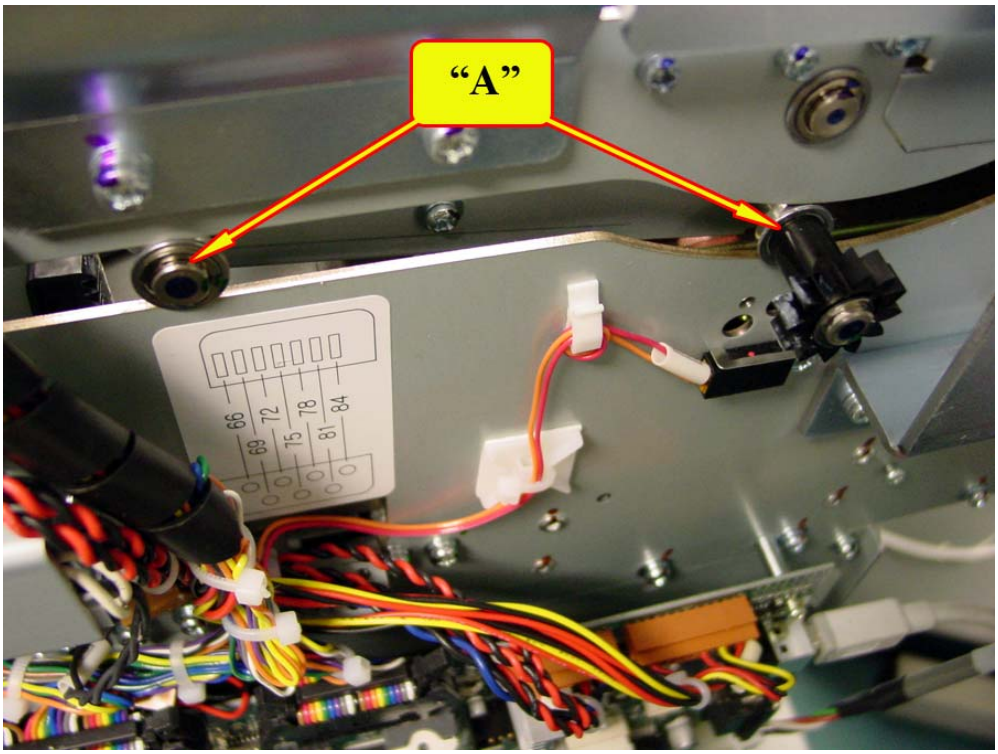



Fig. 7.36 Push Plate Transport Bearing

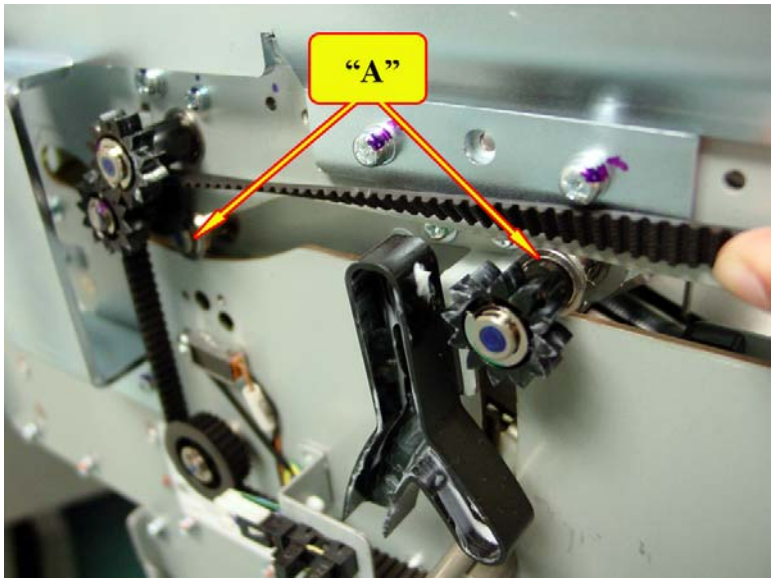
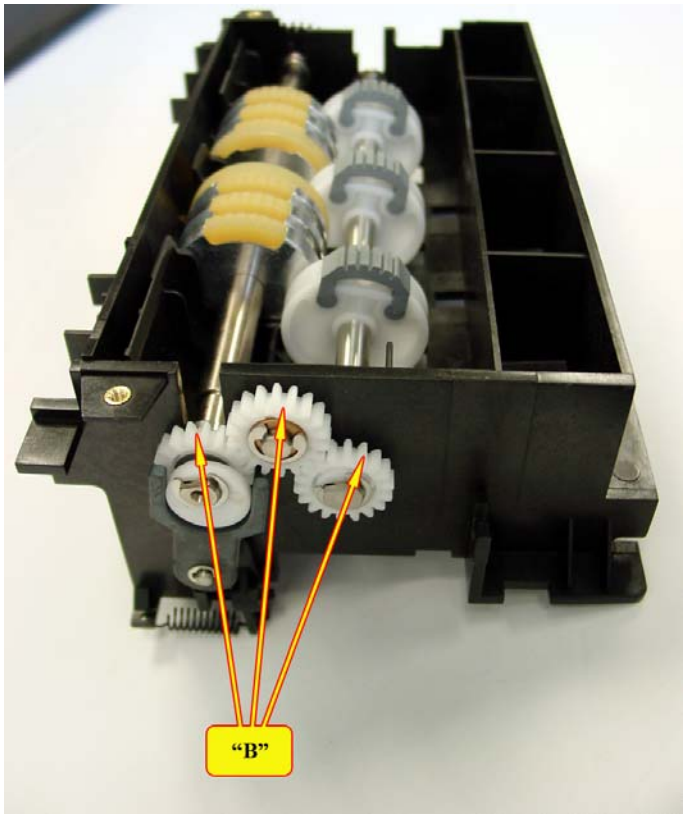
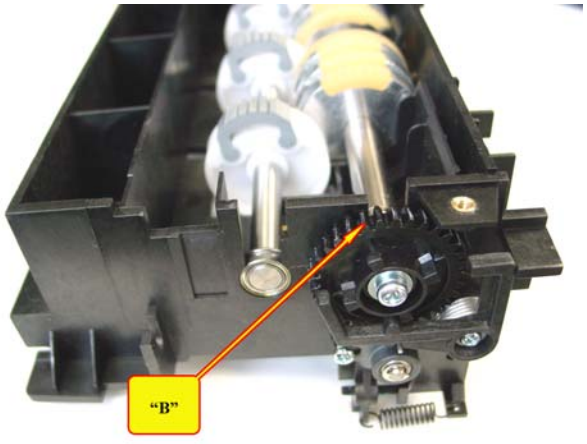



Fig. 7.37 Push Plate Transport Bearing




**Cassette Pick Up Mechanism**

Fig. 7.38 Note Separate assembly (Gear teeth surface)




**Cassette Pick Up Mechanism**

Fig. 7.39 Note Separate assembly (Gear teeth surface)

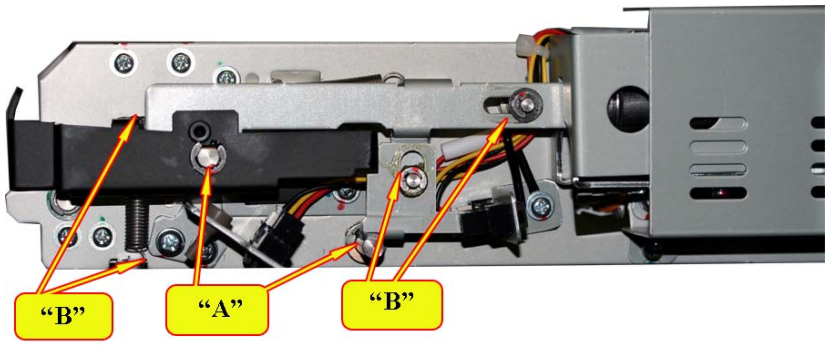



Fig. 7.40

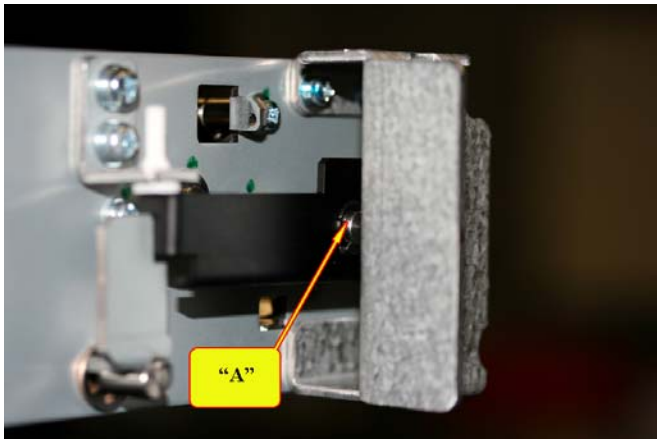



Fig. 7.41

After machine has been lubricated, unit MUST BE FULLY TESTED.

Fill Out ATM Repair Log Sheet

### 7.4.3 Switch Settings

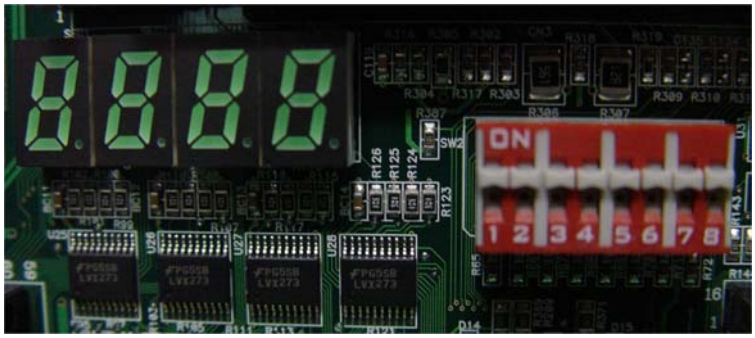



Fig. 7.42

#### 7.4.3.1 Dip Switch on Controller Board

| DIP SWITCH | | | | | | | | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| On | On | On | On | On | On | On | On | Transaction Mode |
| Off | On | On | On | On | On | On | On | Program Download Mode<br>(Refer to below about how to download) |
| On | Off→ On | On | On | On | On | On | On | Default Sensor Setting Mode<br>(Refer to below about how to use it) |
| On | On | Off→ On | On | On | On | On | On | Automatic Sensor Adjustment mode<br>(Refer to below about how to use it) |

※ How to download Cash Dispenser Program

① Turn power off

② Completely put ROM Pack board for downloading into CDU main board

③ Turn on the No 1 DIP switch and then turn power on power supply

④ Check 7 segments changing as follows

: 'L0'→ 'L6'→ 'L7'→'0' or Off

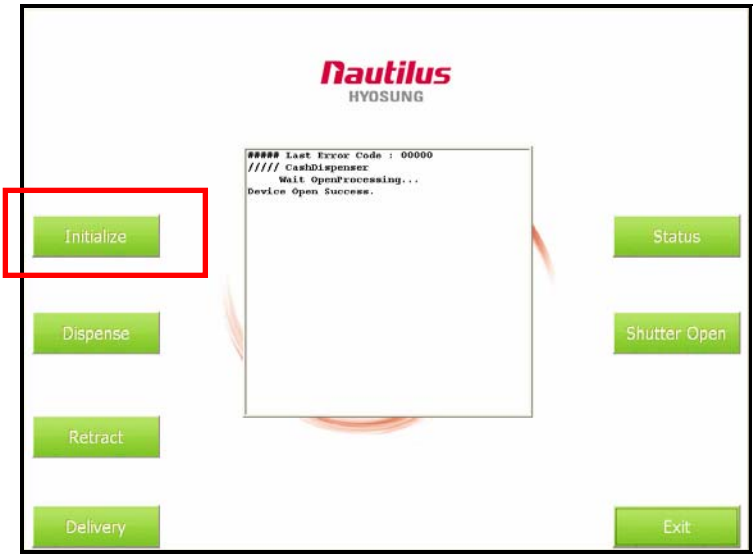
⑤ Turn power off and carefully remove ROM Pack board.

⑥ Turn off No 1 Dip switch

⑦ Turn on power and initialize CDU

※ In case No2 or No3 switch will be used

① When the sensor (CS4, CS10, CS13, CS14) is clean : The 'Initialize' button on Cash Dispenser diagnostic mode should be pressed




② When the control board is replaced :

Execute Dip switch 2 Off/On and then Dip switch 3 Off/On

③ When sensor error occurred :

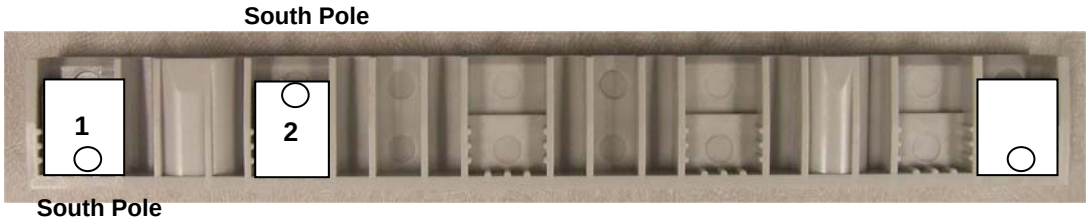
- Check if there remain dusts or unknown objects on sensor, and the remove them completely.
- Press the 'Device Reset' button on Cash Dispenser diagnostic mode
- If error is not clear in case above actions are taken
  : Run the Automatic Sensor Adjustment mode (Dip switch 3 Off/On)

### 7.4.3.2 Cash Cassette Magnet Configuration

Inside the Cash cassette cover, there is a magnet that recognizes the Cassette ID on the left frame, and through this magnet configuration, the cash dispenser correctly identifies the Cassette ID. In case the Cash Cassette ID is not recognized, check first if the magnet configuration is set up properly.
In order to change the Cash Cassette ID, rearrange the magnet configuration referring to the Magnet Configuration Table below.

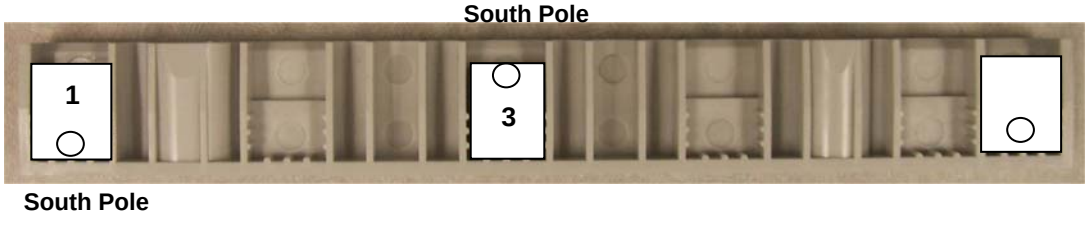
- Cassette ID 1

| 1 | 2 | 3 | 4 | | Reserved | Reserved |
|---|---|---|---|---|---|---|



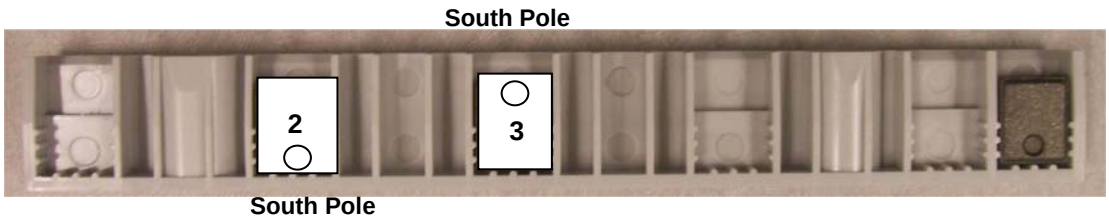

- Cassette ID 2

| 1 | 2 | 3 | 4 | | Reserved | Reserved |
|---|---|---|---|---|---|---|



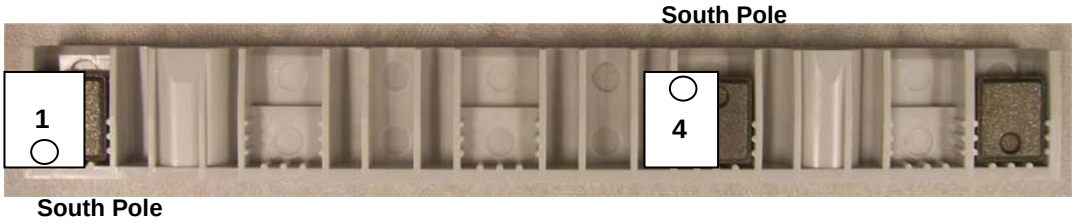
- Cassette ID 3

| 1 | 2 | 3 | 4 | Reserved | Reserved |
|---|---|---|---|---|---|




- Cassette ID 4

| 1 | 2 | 3 | 4 | Reserved | Reserved |
|---|---|---|---|---|---|




- Cassette ID 5

| 1 | 2 | 3 | 4 | Reserved | Reserved |
|---|---|---|---|---|---|

- Cassette ID 6

| 1 | 2 | 3 | 4 | Reserved | Reserved |
|---|---|---|---|---|---|

① Open the cassette cover.

② Loosen the M3 fixing screw (2 places) on the magnet base bracket.

③ Remove the magnet base bracket and magnet for note identification.

④ Replace the magnet or change the configuration to the desired ID.

When you replace the magnet or change the configuration, make sure that it should be follow the instruction about magnet ID configuration not to have same pole with neighboring them.

⑤ Assemble the unit in the order of ④~①.

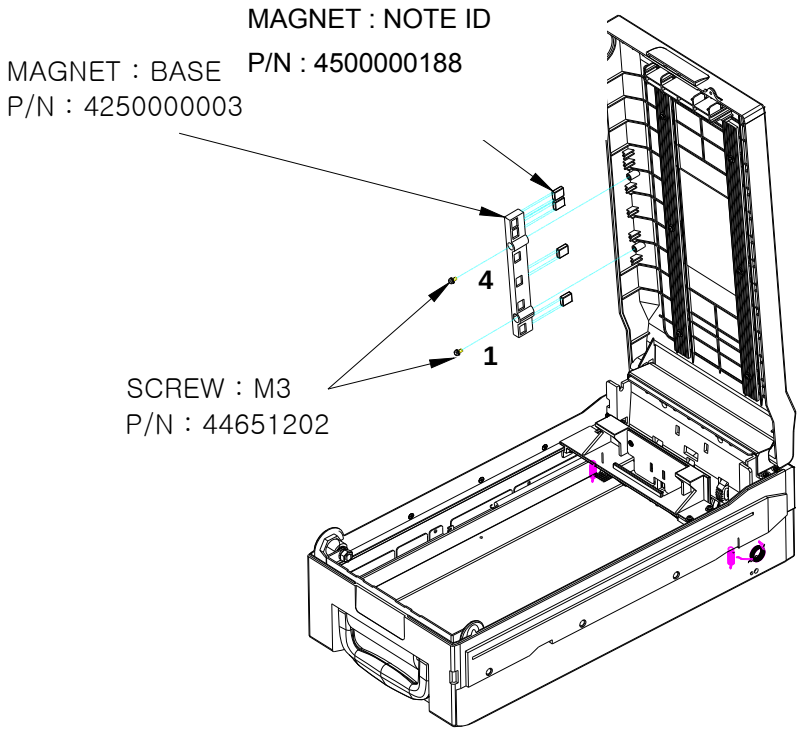
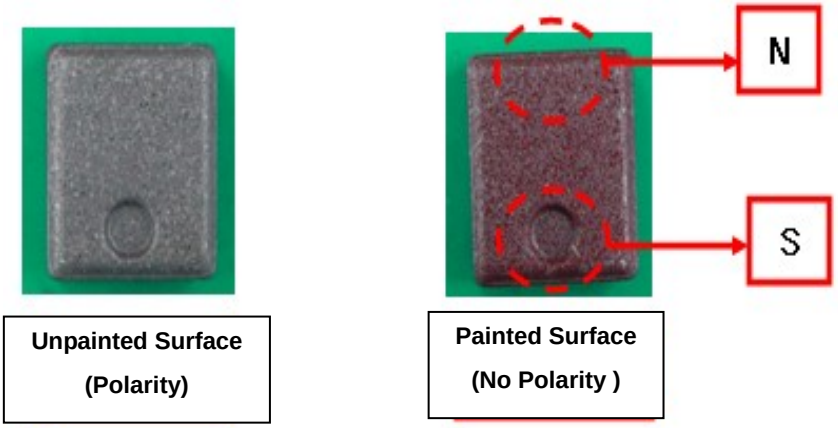



Fig. 7.43

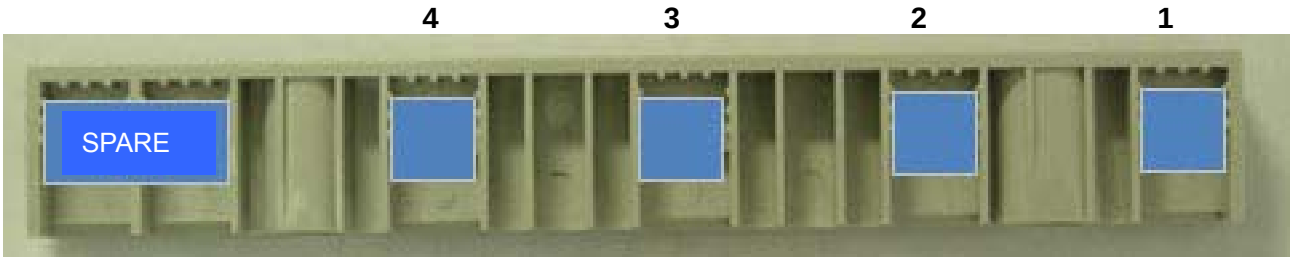
**[WARNING!]**

**When the magnet for note identification is replaced or changed, you should follow the assembly process to verify the cassette configuration.**
**Otherwise, the ATM machine loaded with cassette may cause dispensed errors.**

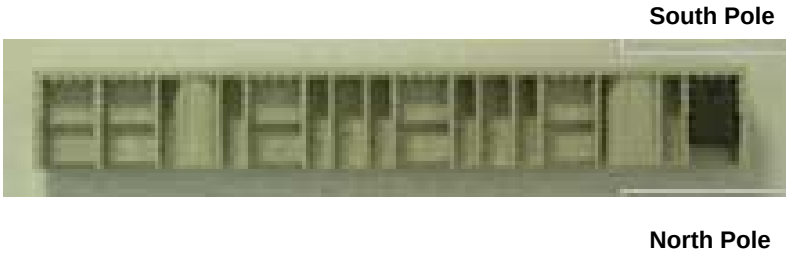
## ※ How to set the cassette ID magnet (Detailed Information)



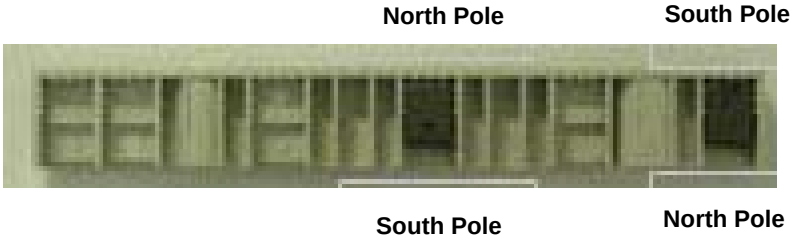

① Identify the magnet location of the Magnet Base



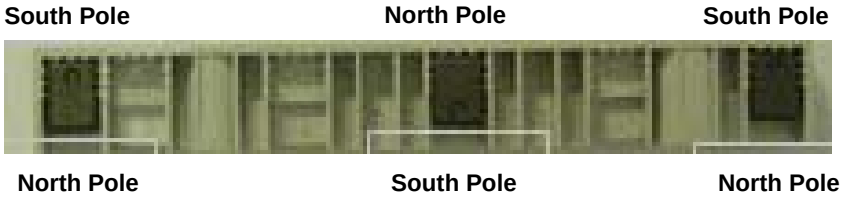

② Insert the magnet facing the unpainted surface of ID magnet to ID sensor (outside) as shown in the following picture




③ Insert the next magnet to have opposite pole configuration as shown in the following picture.



④ As the same way, insert the spare magnet with opposite pole configuration with neighboring one.



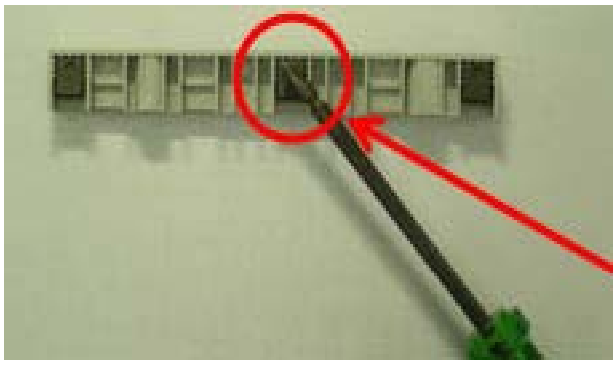

## [Checkpoints]

**- Check if the south pole of magnetic is located on opposite direction in turn**

**- Check if the unpainted surface of magnetic is displayed to you.**




**- Check if a screw driver is attracted to the magnet when it is attached, as shown the following picture**



**Check the driver to be attracted to the Magnet.**

## 7.5 Removal/Installation Procedure for Field Technician

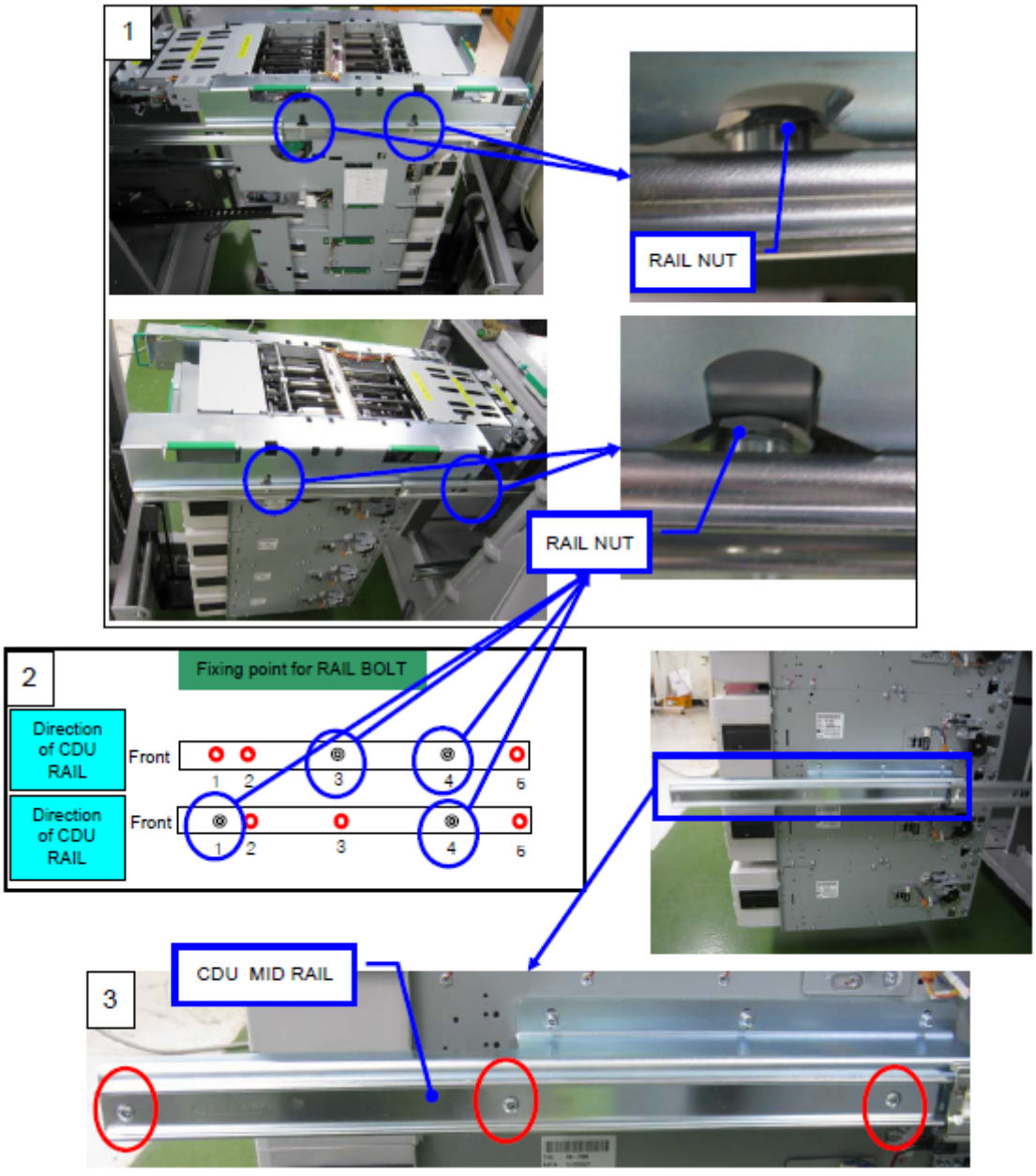
In the field, the range of repairs, which may involve disassembly and assembly of various components. In order to repair other components, the entire CDU unit should be replaced at the Depot. Note however, that this is just a recommendation and can be adjusted depending on field condition or capability of the technician.

| SECTION | LOCATION DETAIL | REMARK |
|---|---|---|
| Entire Unit | Cash Dispensing Unit | **For field technician is available** |
| Sensor | CS11(A,B) / CS21(A,B) / CS31(A,B)/ CS41(A,B)<br>CS14D,T / CS3 / CS8/ CS2 / CS9D /<br>CS19 / CS29 / CS39 / CS49 / CS15 / CS6<br>CS17 / CS27 / CS37 / CS47 / CS1 D,T / CS4D,T /<br>CS16 / CS26 /CS36 / CS46 / CS10 (A,B) / CS13D,T<br>CS18 / CS28 / CS38 / CS48<br>CS12 / CS 22 / CS32 / CS42 | |
| Controller board | | |
| Micro-clutch Assembly | Micro-clutch Assembly located at each cassette | |
| Solenoid | Gate Shutter Solenoid<br>Exit Shutter Solenoid | |
| Presenter Assembly | | |
| External Components in Cash Cassette | Latch,<br>Push Plate | |
| Motor Assembly | Main Motor<br>Cam Motor<br>Upper Transport Motor | **Depot Level only** |
| The other components except above described. | | **Depot Level and Factory only** |

### 7.5.1 The Entire Unit Replacement

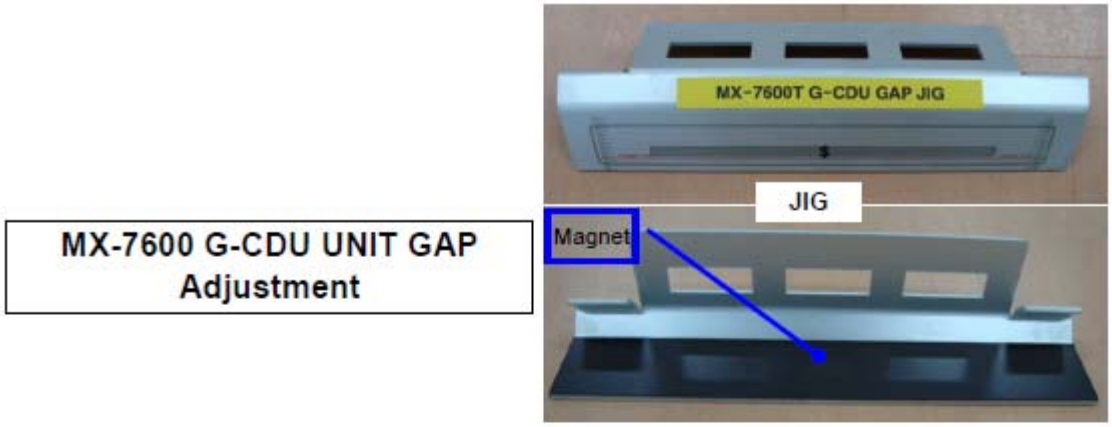
**Mounting G-CDU Assy**

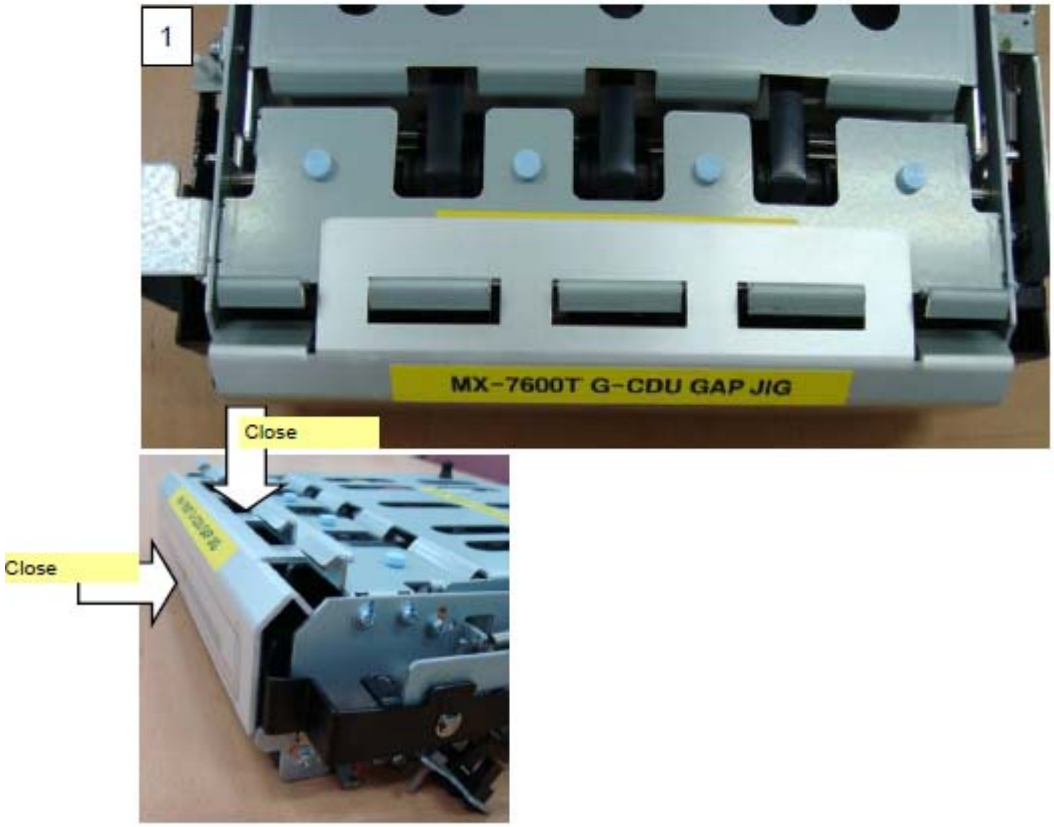
1) Align the CDU Support and Rail Nut using lift as pictured below and let down the lift.
2) Connect G-CDU assembly and CDU rail using TH(+):PFI;M4x8;W/ZN.
   (6 places, Loctite specification)
3) Screw on CDU MID RAIL using TH(+):PFI;M4x8;W/ZN. (3 places, Loctite specification)



## G-CDU Unit Gap Adjustment (1)

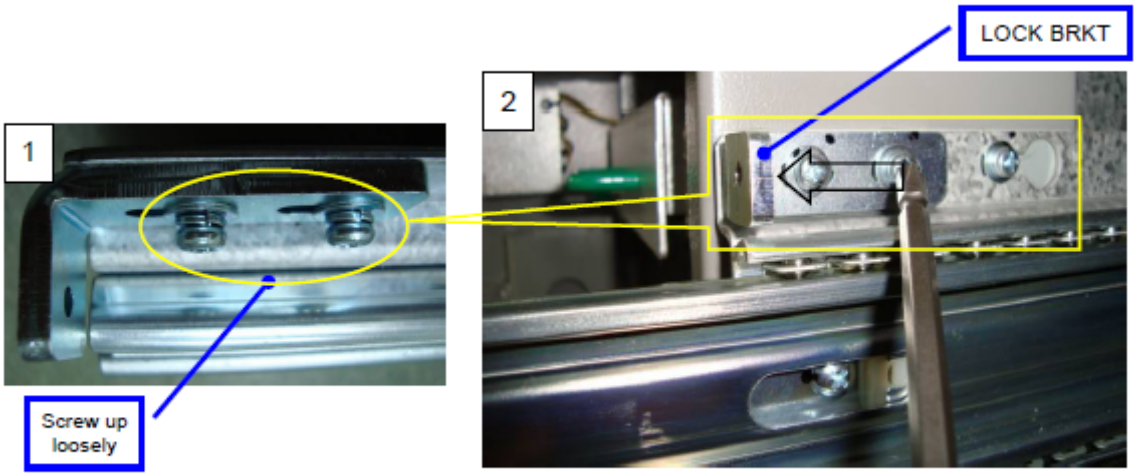
1) Insert Jig into the front of G-CDU and adhere it closely



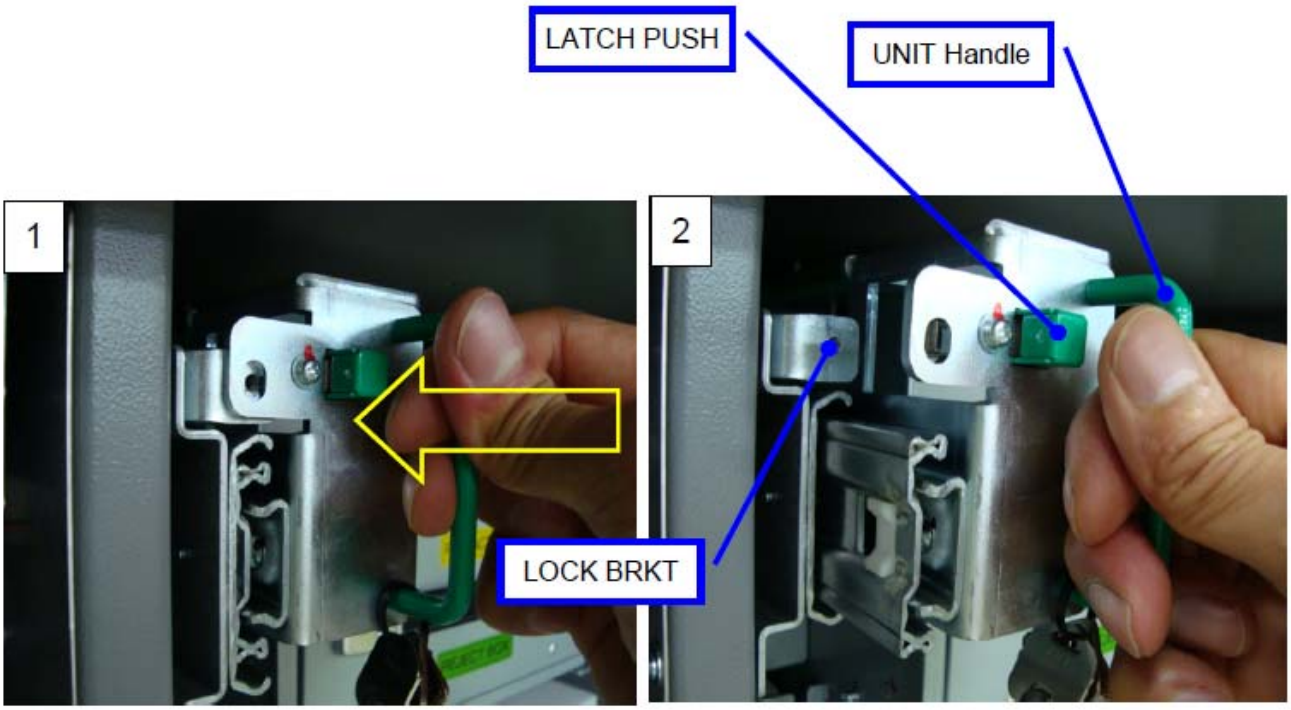
## G-CDU Unit Gap Adjustment (2)

1) Screw up 2 fixing bolts for Lock Bracket loosely.
2) Adhere the bracket closely in an arrow direction.



## G-CDU Unit Gap Adjustment (3)

1) Pull the unit in an arrow direction until it stops.
2) Place Latch Push on Lock Bracket rightly and pull the Unit with pressing Latch Push.
3) Tighten 2 bolts firmly.



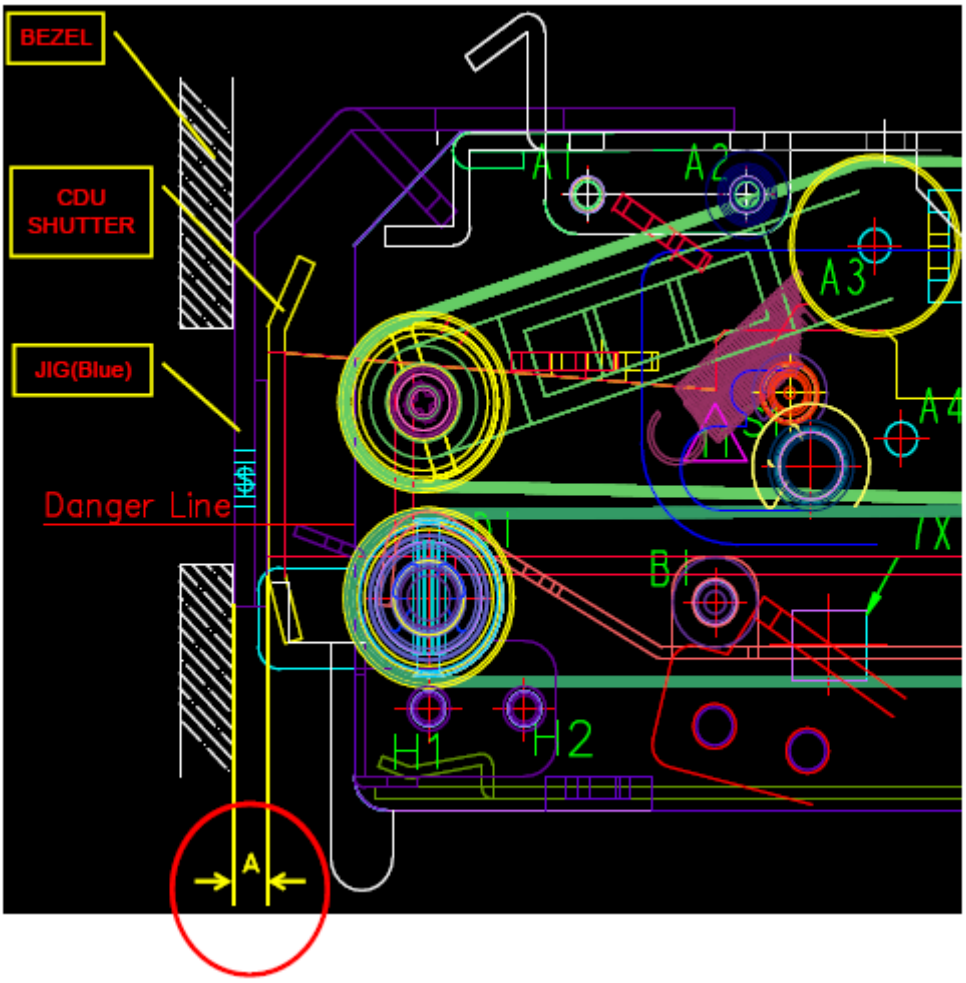

**Notice : Be careful not to move lock bracket when pulling Unit to maintain shutter gap.**




**Notice : Be careful not to move lock bracket when fixing the bolts.**

## G-CDU Unit Gap Adjustment (4)

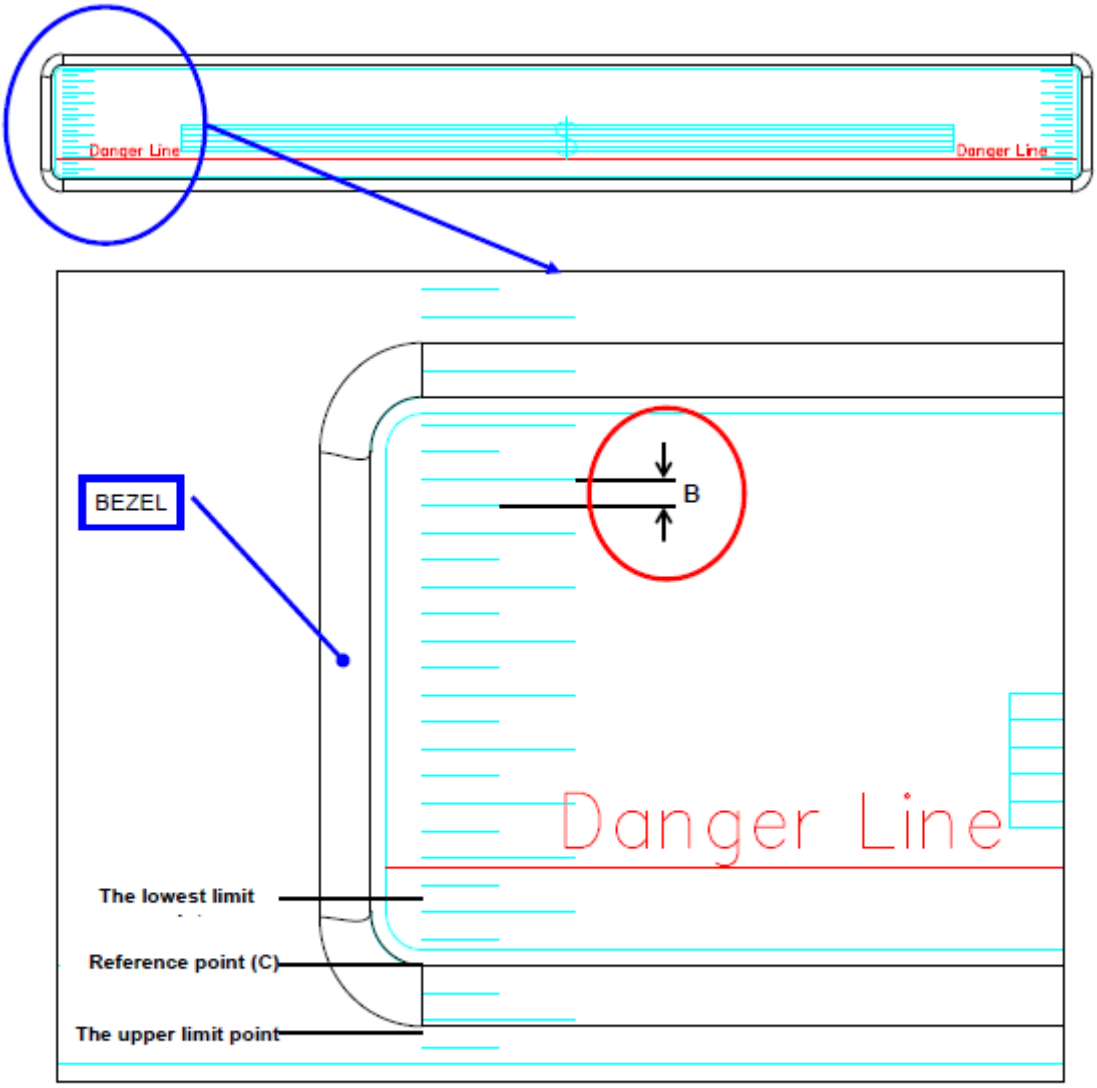
1) Adjust A by 3mm +0.5mm.



## G-CDU Unit Gap Adjustment (5)

1) Match Jig square outline and Bezel outline.

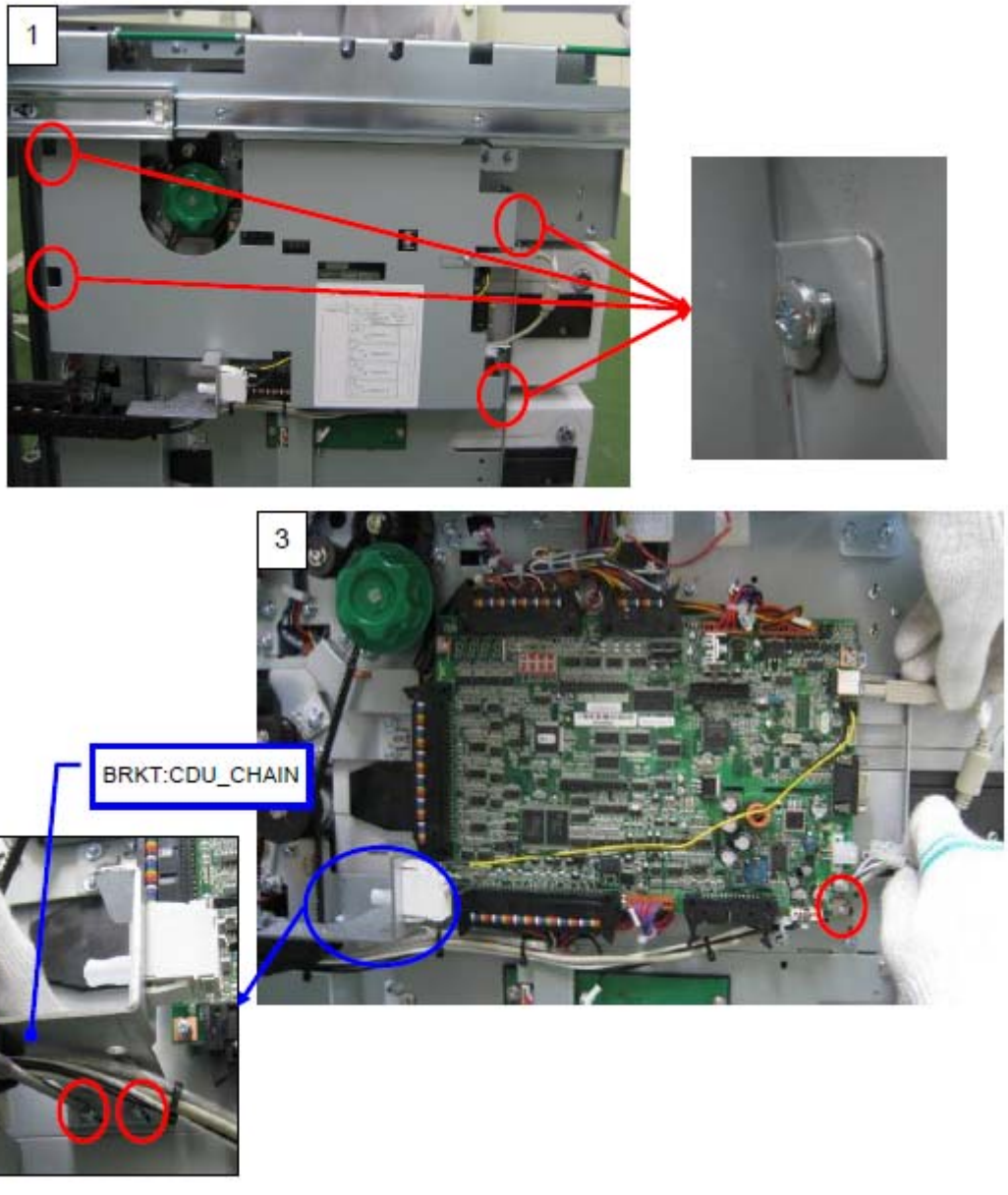
2) Adjust the reference point (C) by ±2.5mm.




Reference : 1. As the Danger Line becomes closer to the reference line, it becomes far from the best adjustment.
2. B is 1mm.

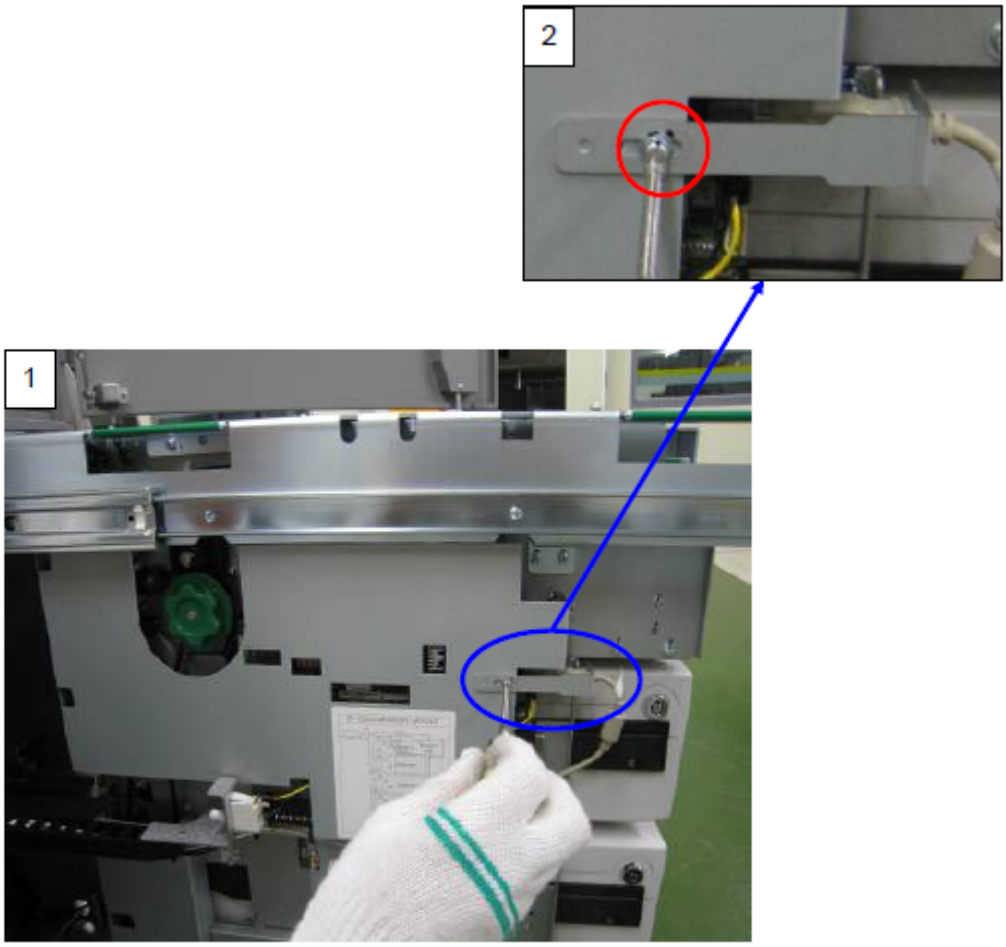
## Assembling CDU chain bracket (BRKT:CDU_CHAIN) and inserting board cable

1) Remove CDU board cover by unscrewing 4 bolts loosely.
2) Screw up CDU chain bracket (BRKT:CDU_CHAIN). ( 2 places)
3) Remove a bolt from main board and insert the power and communication cable through the rear of the board. Tighten the bolts again.



## Fixing Communication cable for CDU board

1) Assemble CDU board cover again.
2) Fix the communication cable with fixing bracket as above picture.



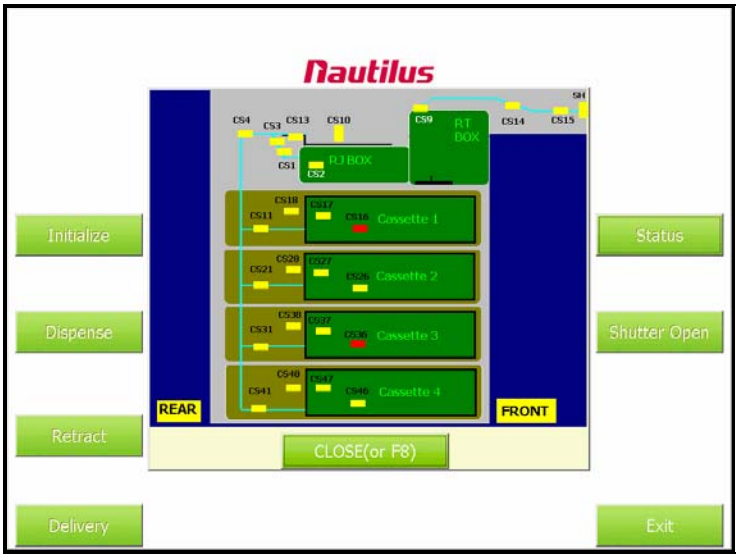
### 7.5.2 Sensor Replacement

The Cash Dispenser contains 60 sensors in total including 27 transport path sensors, 5 encoder sensors, 5 docking sensors, 4 cash low sensors , 8 bill empty sensors, 4 cassette ID sensors, 2 double bill detection sensors, 2 cam sensors, 1 withdrawal detection sensor and 2 shutter operation sensor.

To replace any sensor in Cash Dispenser, the recommend procedures is as follows

① Open the safe door with password
② Turn off power at the power supply
③ Holding the green locking button on the cash dispenser and pull out the rail until the CDU is fully extended
④ Remove a protective steel cover on control board by removing four screws
⑤ Keep the detailed procedures referring to next chapter at each sensor

After the replacement of any sensor, make sure that this will be properly working in diagnostic program by entering technician mode (Test Path : Technician Mode -> Cash Dispenser -> Status**)**

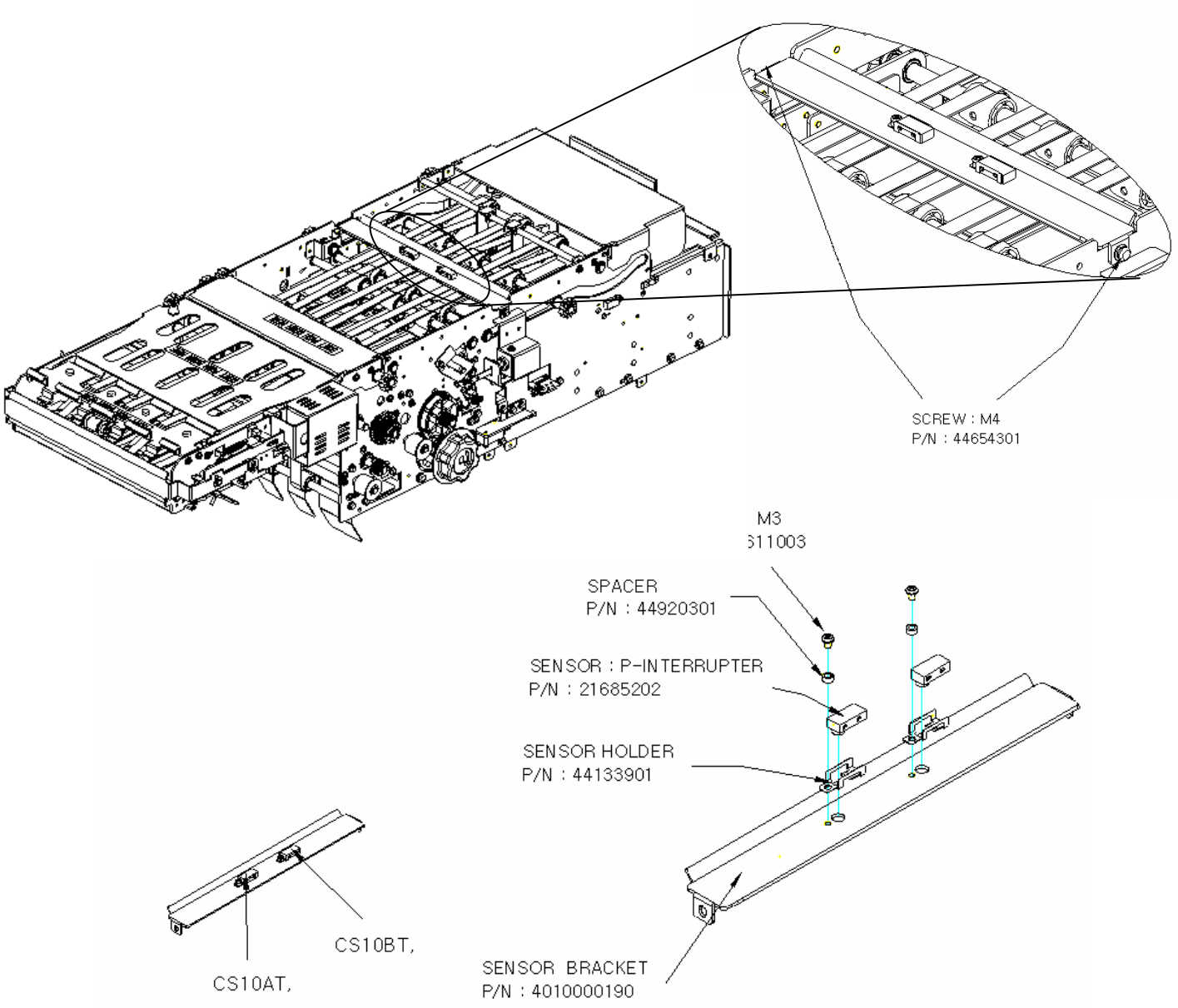



Yellow color : Normal status , Red color : Abnormal status

### 7.5.2.1 Main Body Module

#### 1) Stacker Bill Sensor_Transistor (CS10T A,B)

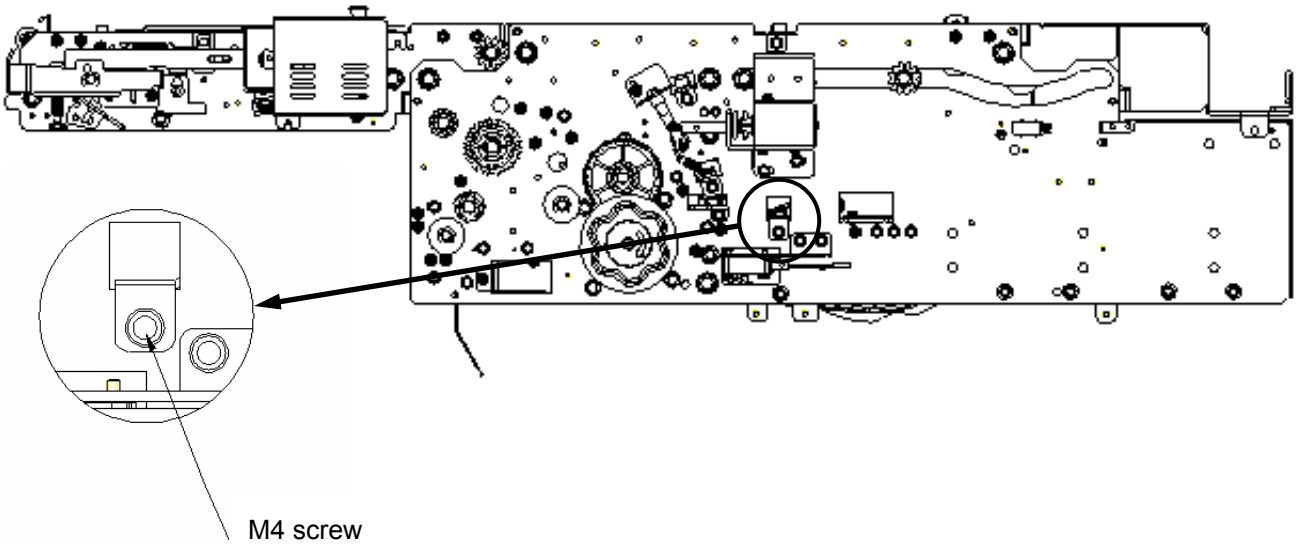
① Remove the M3 screw on Sensor Bracket
② Disconnect the connector and remove the cable tie and take it out.
③ Replace the sensor.
④ Assemble the unit in the reverse order of ②~①.



### 2) Stacker Bill Sensor_Diode (CS10D A,B)

① First, revolve the Cam to place the temporary stacker to the upper direction.

② Remove a M4 screw (1 place) on Sensor Bracket Assembly as shown in the below figure.

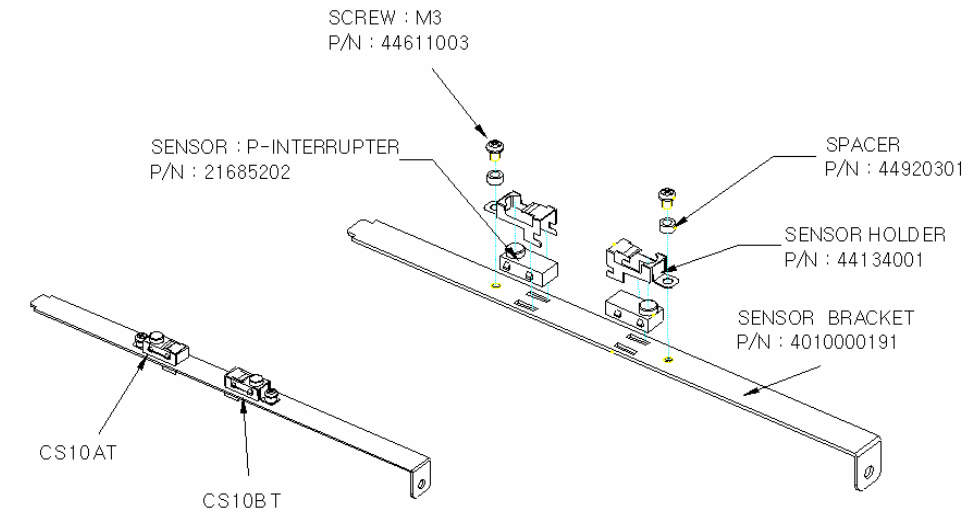



③ Disconnect the connector and remove the cable tie to remove the Sensor Bracket Assembly.
Be careful not to break the connector pin when removing.

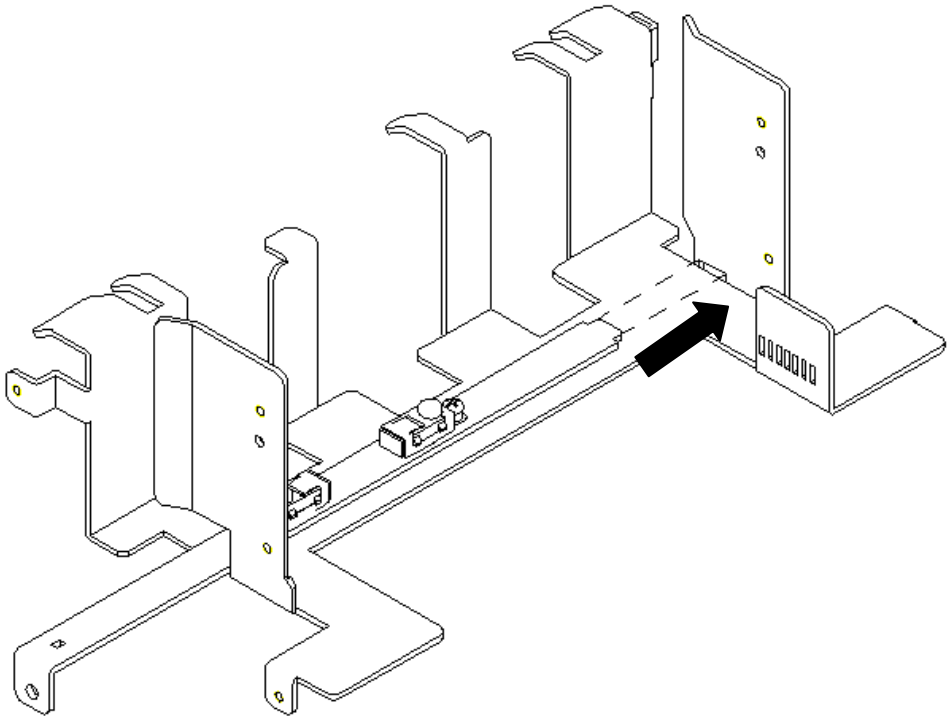
④ Take out the Sensor Bracket Assembly slowly.

⑤ Remove the M3 sensor fixing screw (1 place) of the sensor to replace from the removed Sensor Bracket Assembly.

⑥ Replace the sensor.

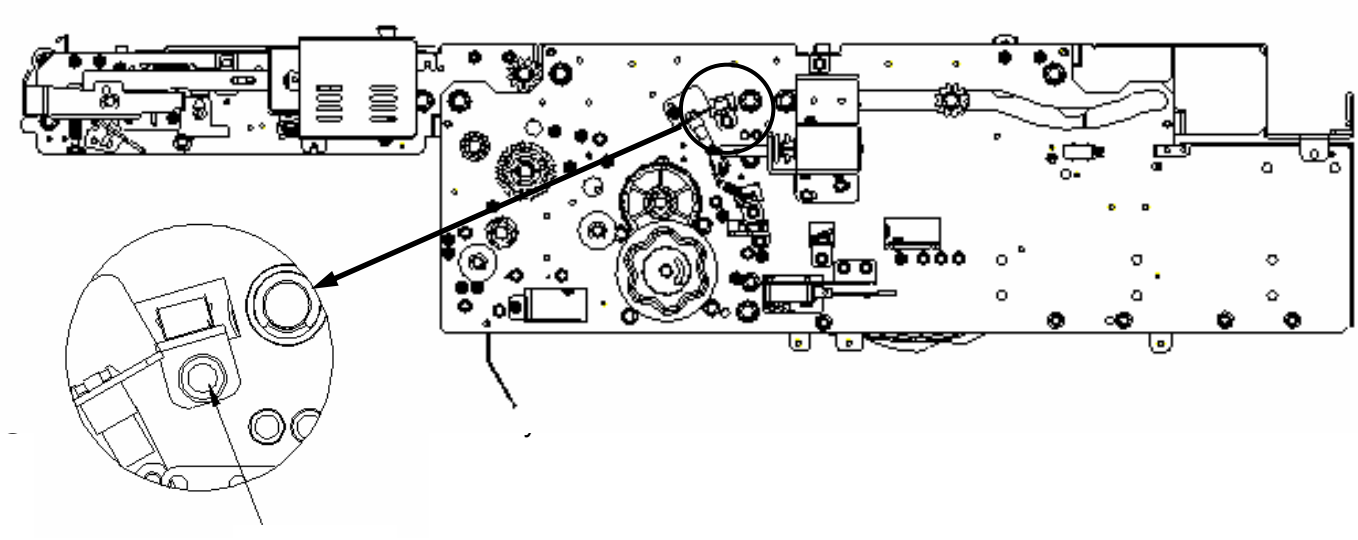


⑦ Assemble the unit in the reverse order of ⑤~①. When assembling the Sensor Bracket Assembly into Cash Dispenser, make sure to insert the edge of Senor Bracket s to the body groove on the other side and tighten the M4 fixing screw (1 place).



### 3) Bill Count Sensor_Transistor (CS13T)

① Remove the sensor support M4 fixing screw (1 place) as shown in the below figure.

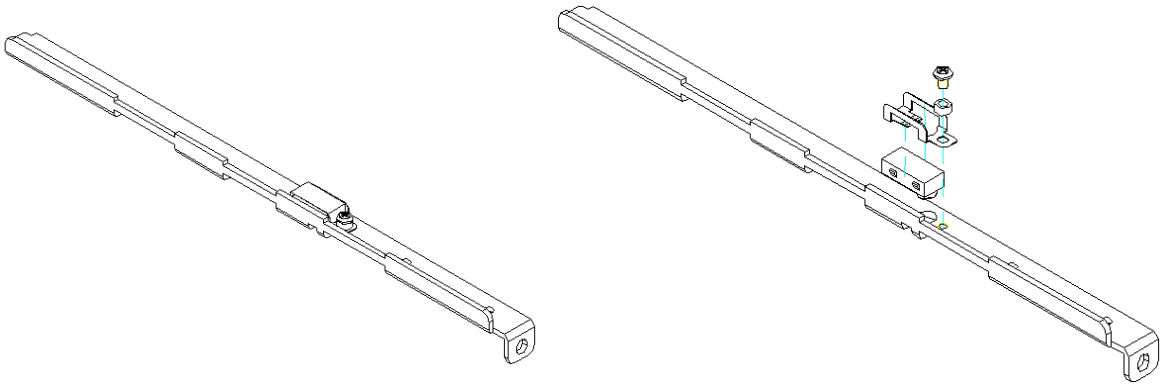


M4 screw

② Disconnect the connector and remove the cable tie to remove the Sensor Bracket Assembly. Be careful not to break the connector pin when removing.

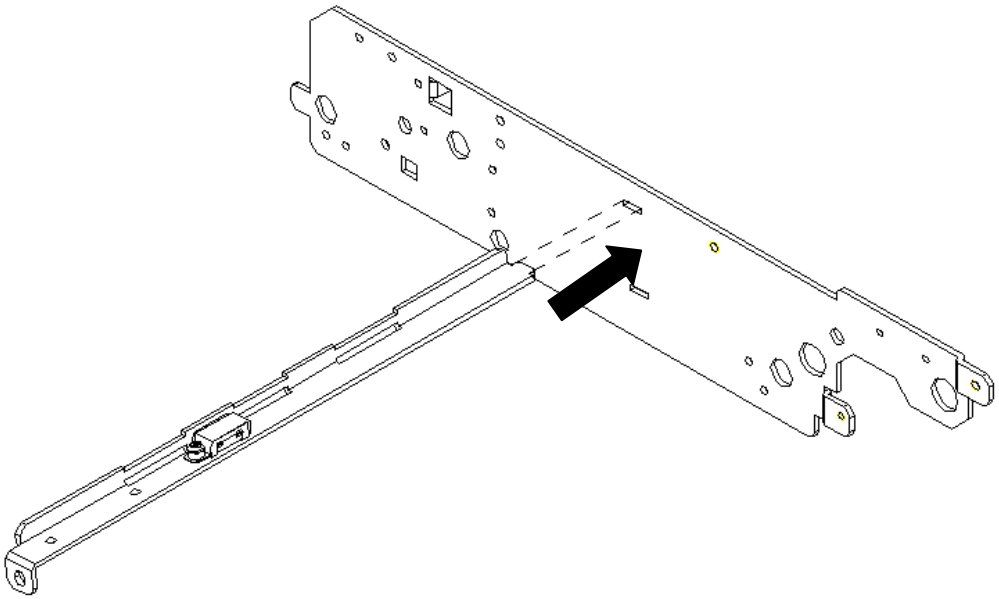
③ Remove the Sensor Bracket Assembly.

④ Remove the M3 sensor fixing screw (1 place) of the sensor to replace from the removed Sensor Bracket Assembly.



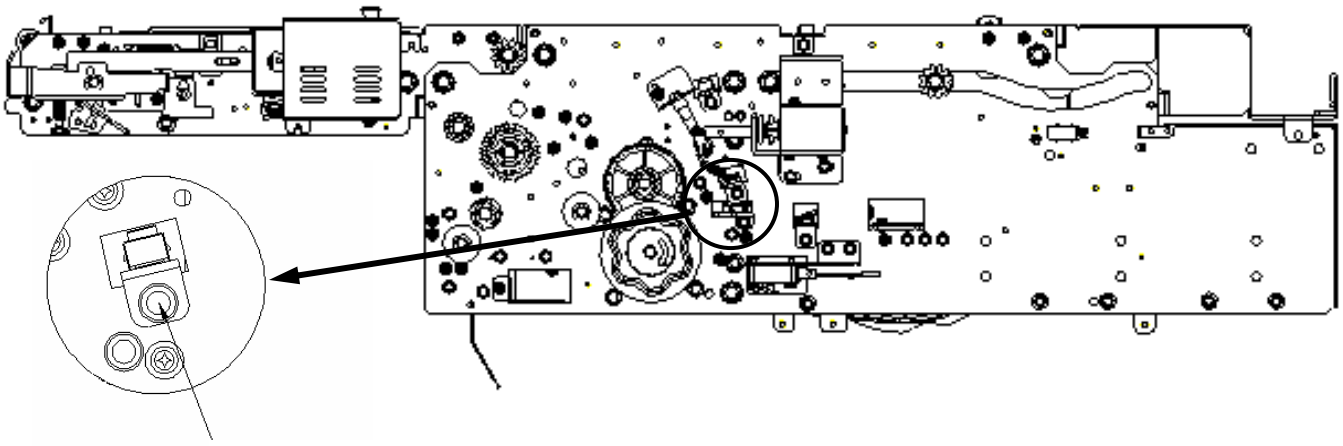
⑤ Replace the sensor.

⑥ Assemble the unit in the reverse order of ④~①. When assembling the Sensor Bracket Assembly, align the edge of Bracket to the body groove and tighten the M4 fixing screw (1 place).



### 4) Bill Count Sensor_Diode (CS13D)

① Remove the sensor support M4 fixing screw (1 place) as shown in the below figure.



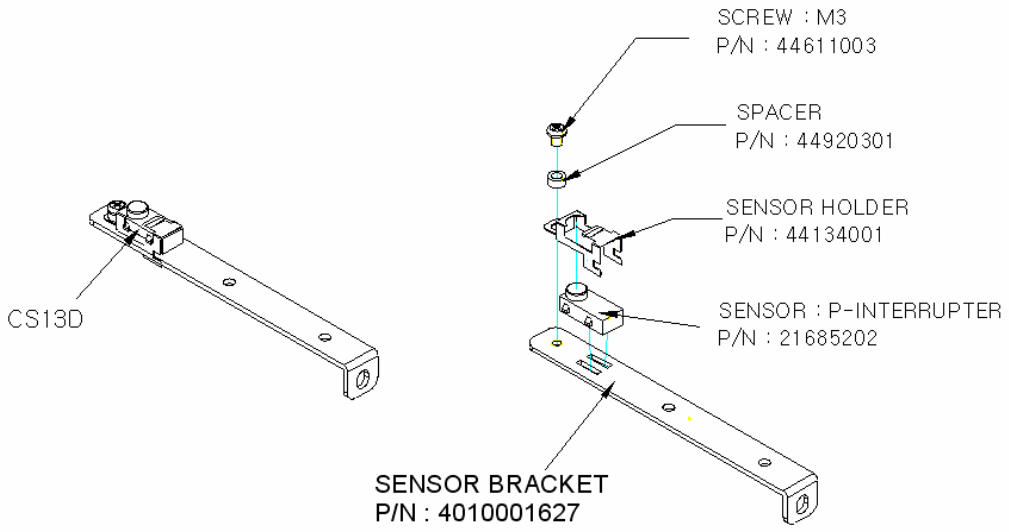

② Disconnect the connector and remove the cable tie to remove the Sensor Bracket Assembly. Be careful not to break the connector pin when removing.

③ Remove the Sensor Bracket Assembly.

④ Remove the M3 sensor fixing screw (1 pace) of the sensor to replace from the removed Sensor Bracket Assembly.

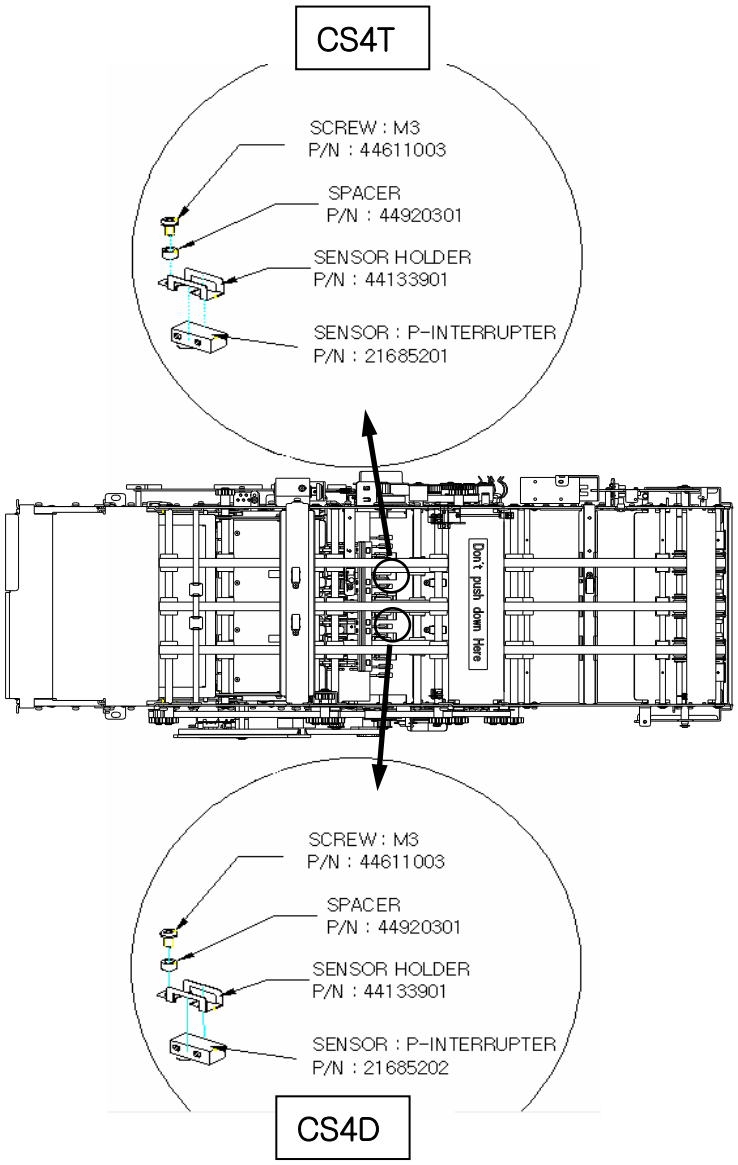
⑤ Replace the sensor.

⑥ Assemble the unit in the reverse order of ④~①. When assembling the Sensor Bracket Assembly, align the rectangular to the body groove and tighten the M4 fixing screw (1 place).



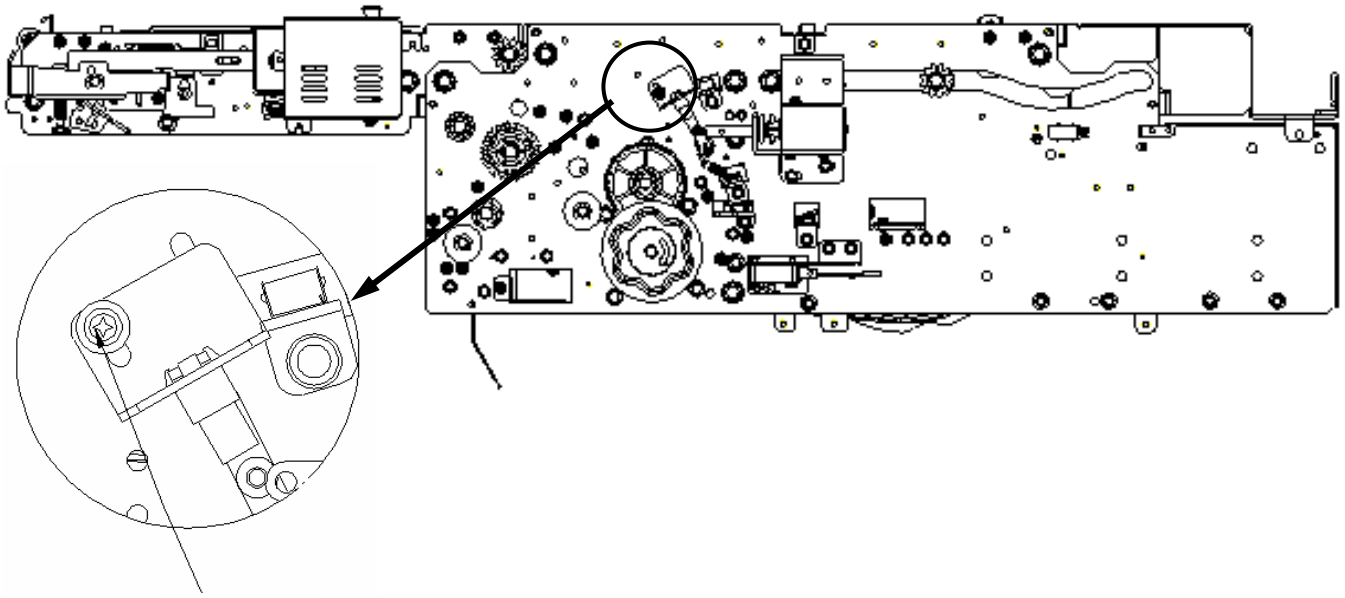
### 5) Gate judgement Sensor (CS4D,T)

① Disconnect the connector and remove the cable tie to remove the sensor supporter. Be careful not to break the connector pin when removing.
② Remove the M3 sensor fixing screw (1 place each) to replace from the fixed Sensor Bracket .
③ Replace the sensor.
④ Assemble the unit in the order of ②~①.



### 6) Gate Operation Sensor (CS3)

① Remove the M3 fixing screw of the CS3 Sensor Bracket (1 place).



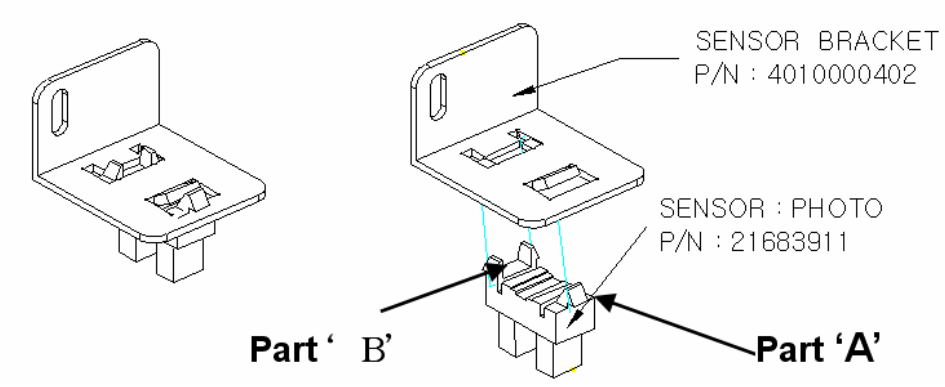
M4 screw

② Disconnect the connector and remove the cable tie to remove the Sensor Bracket. Be careful not to break the connector pin when removing.

③ Remove the black rubber which attached to back of the Sensor Bracket.

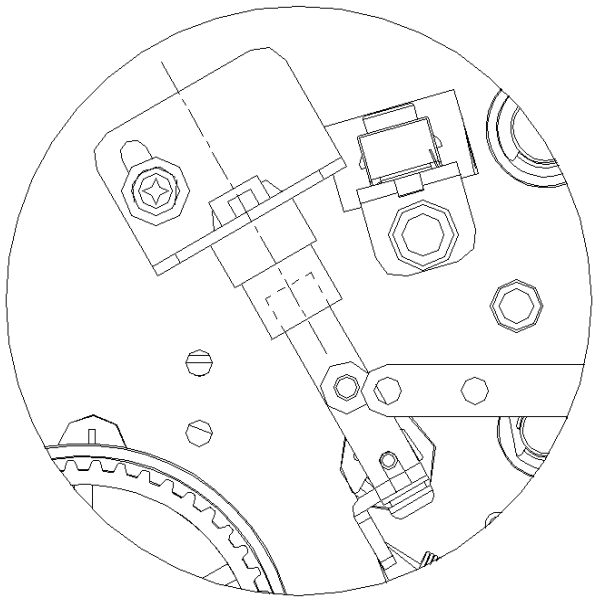
④ Press the part 'B' of the sensor softly as shown in the below figure to remove the lock and sensor.

⑤ To insert the sensor, insert the part 'A' first and press the part 'B' to lock.



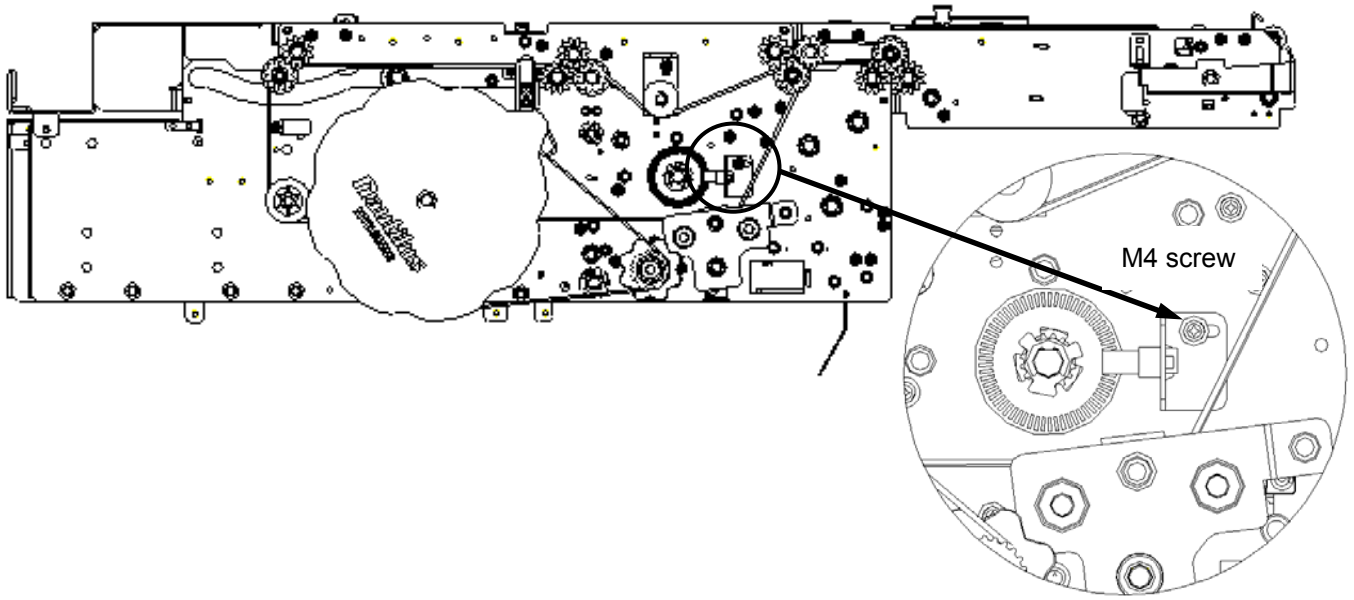
⑥ Assemble in the order of ④~①.

⑦ Before tightening screw of CS3 sensor, first release the plunger of the solenoid and make sure to adjust the solenoid indicator to the center of the sensor. After checking that, tighten screw completely.



### 7) Main motor Encoder sensor (CS8)

① Remove the M4 fixing screw of the CS8 Sensor Bracket (1 place).

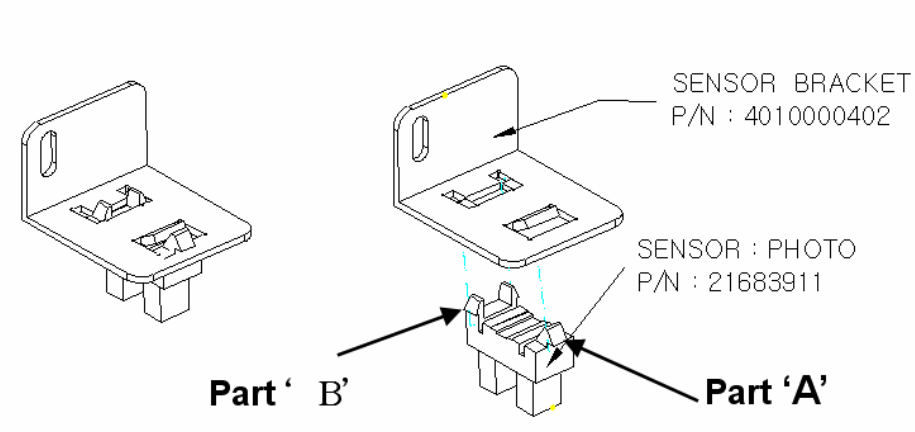



② Disconnect the connector and remove the cable tie to remove the Sensor Bracket. Be careful not to break the connector pin when removing.

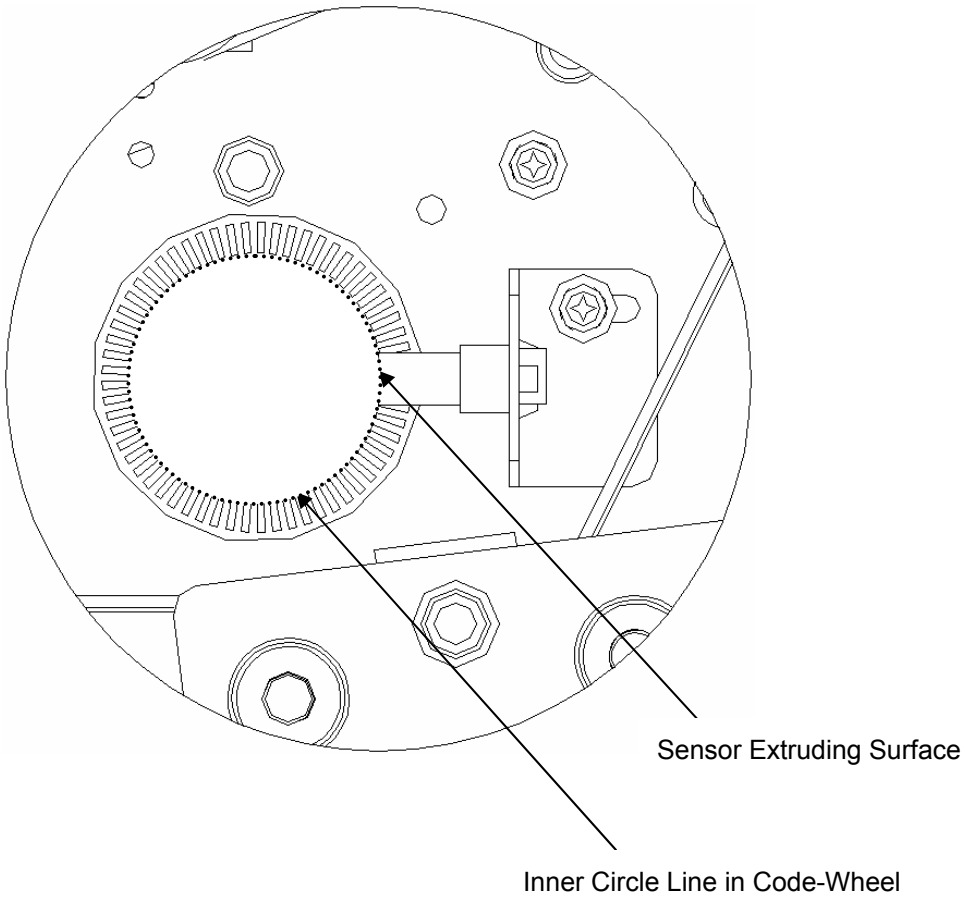
③ Press the part 'B' of the sensor softly as shown in the below figure to remove the lock and the sensor.

④ To insert the sensor, insert the part 'A' first and press the part 'B' to lock.

⑤ Take the reverse order of ③~① to assemble this again.

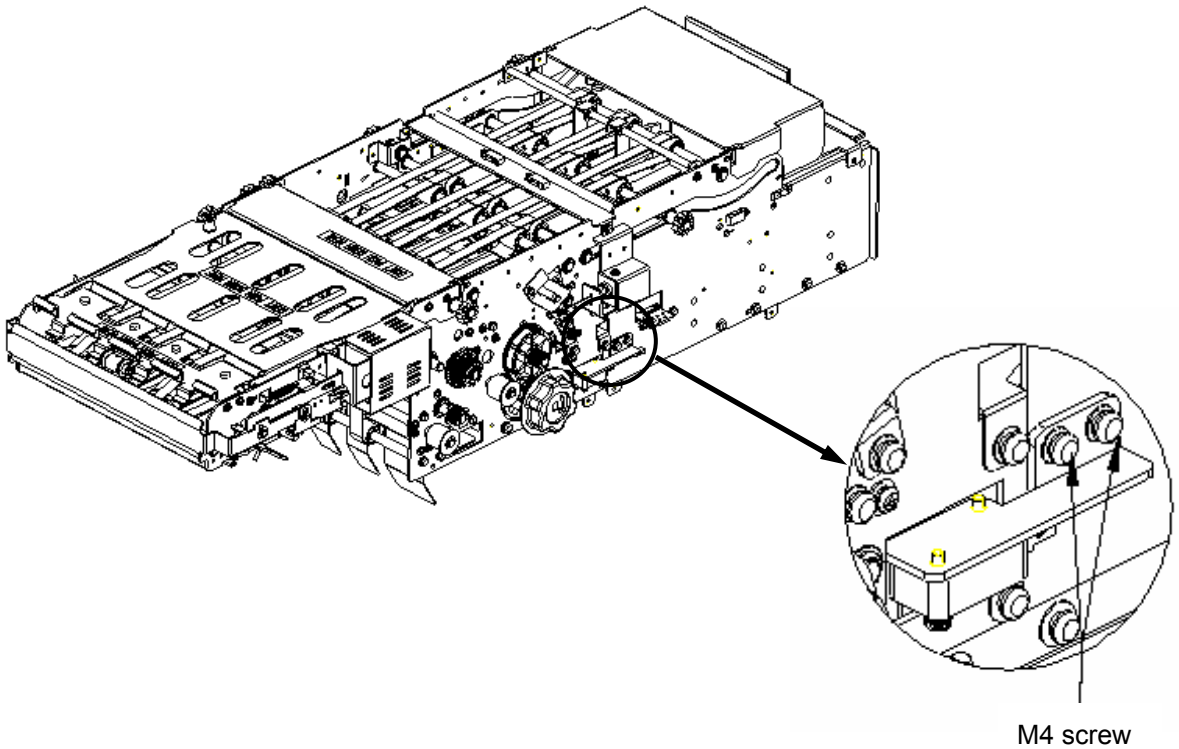


⑥ Before tightening M4 screw, make sure the inner circle line in code-wheel will vertically have same position with the sensor extruding surface slightly adjusting Senor Bracket . After checking that, tighten screw completely.

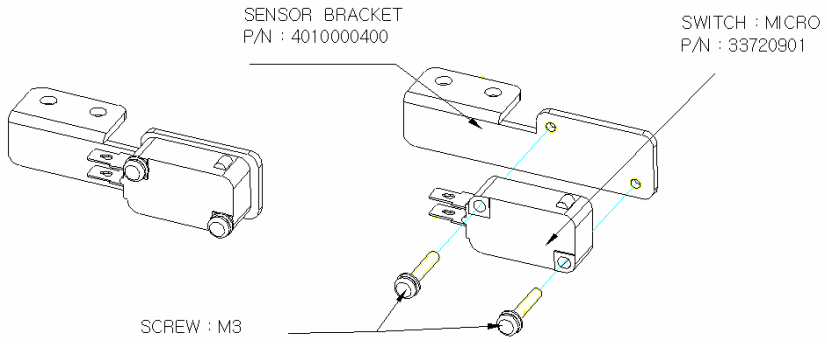


### 8) Rj/Rt Box Docking Sensor (CS2)

① Remove Main Control Board (Refer to Chapter 2.2) for your easy maintenance.
② Remove the M3 fixing screw (2 places) of Sensor Bracket.

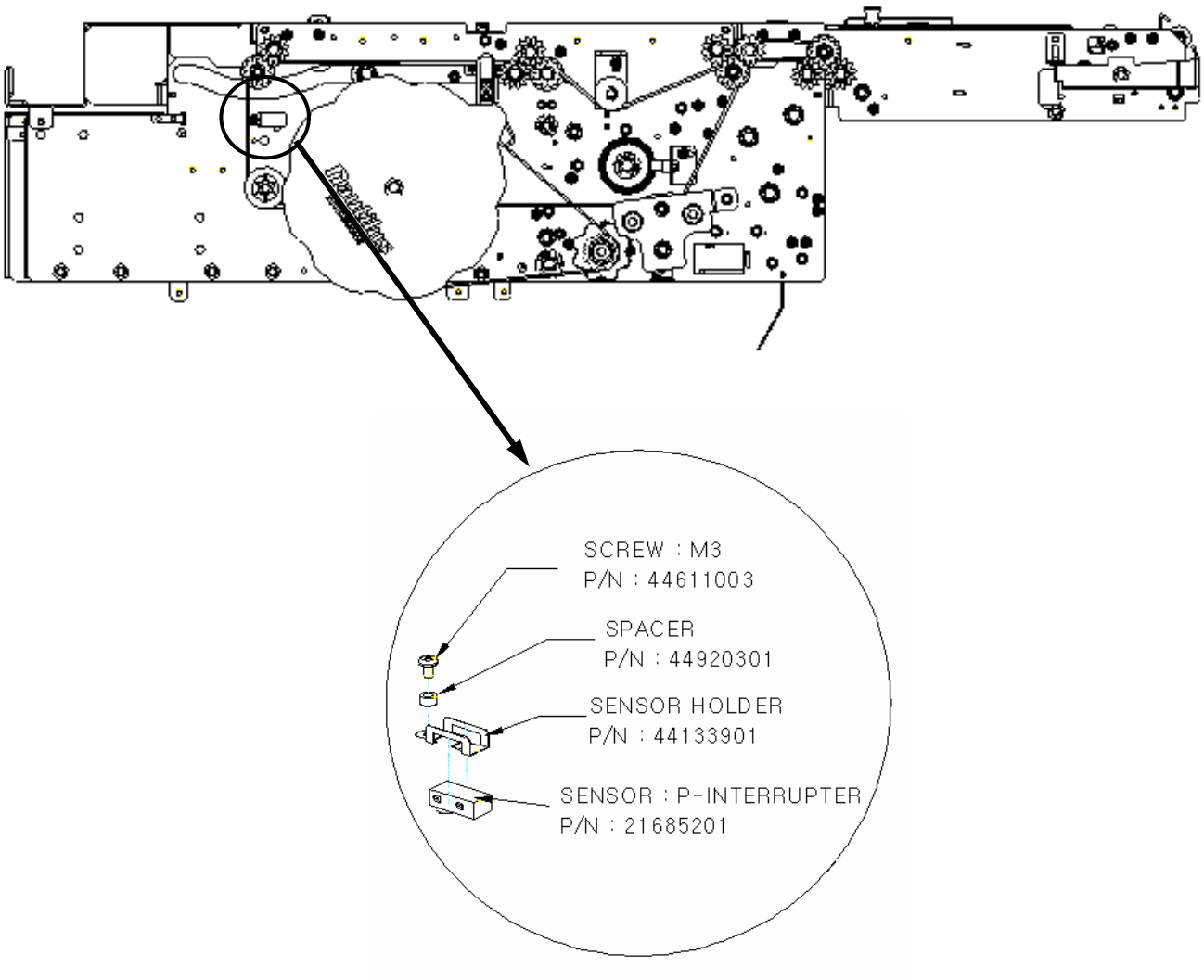



③ Disconnect the connector and remove the cable tie to remove the Sensor Bracket. Be careful not to break the connector pin when removing.
④ Remove the M3 sensor fixing screw (2 places) from the removed sensor supporter.
⑤ Replace the sensor and then assemble in the reverse order of ③~①.
Note) Adjust cassette position when mounting it so that you can hear click sound from the switch.



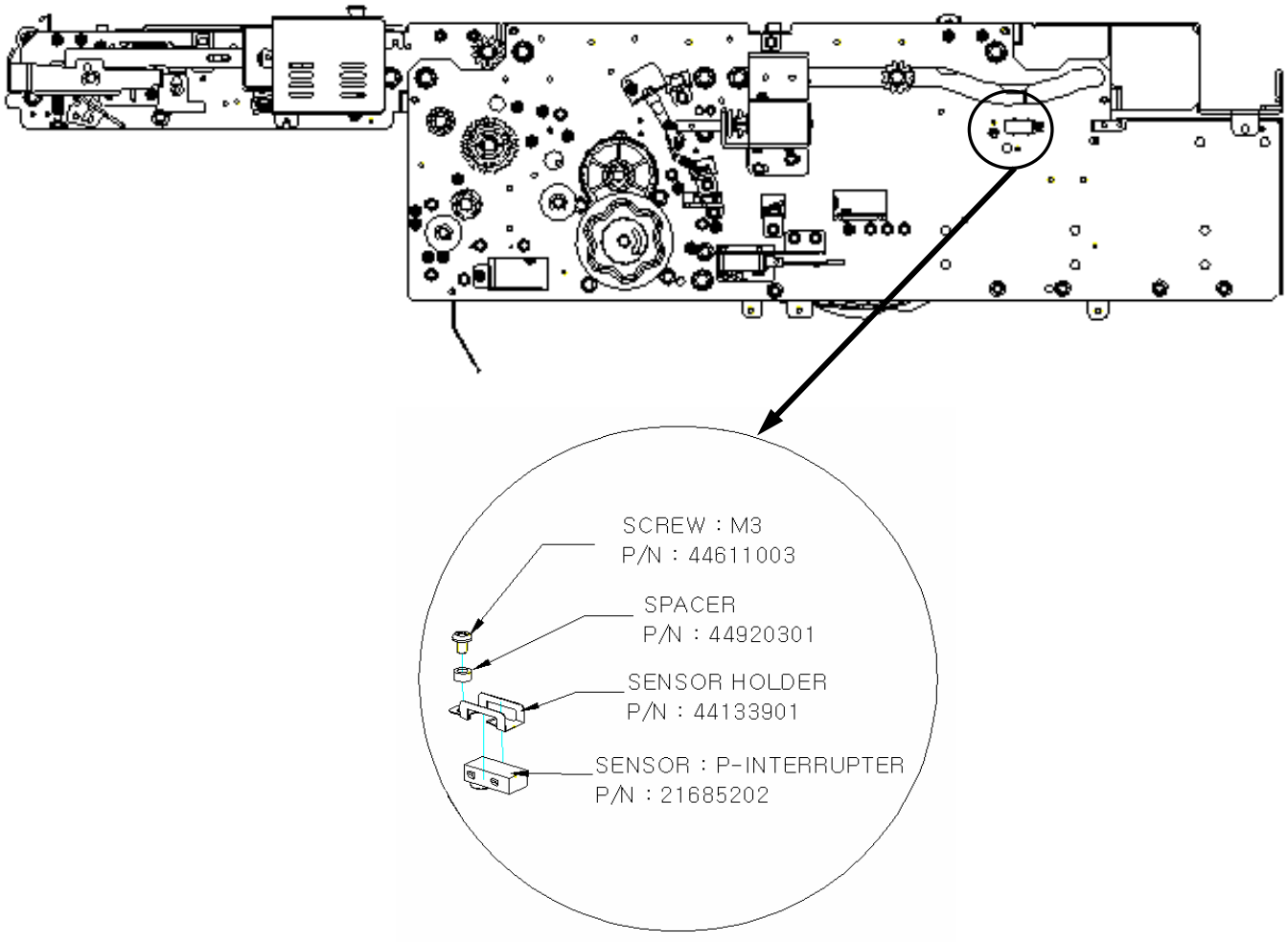
### 9) Rj/Rt Box Full Sensor_Diode (CS9D)

① Remove the M3 fixing screw (1 place).
② Disconnect the connector. Be careful not to break the connector pin when removing.
③ Remove the sensor and replace this one.
④ Assemble in the order of ②~①.



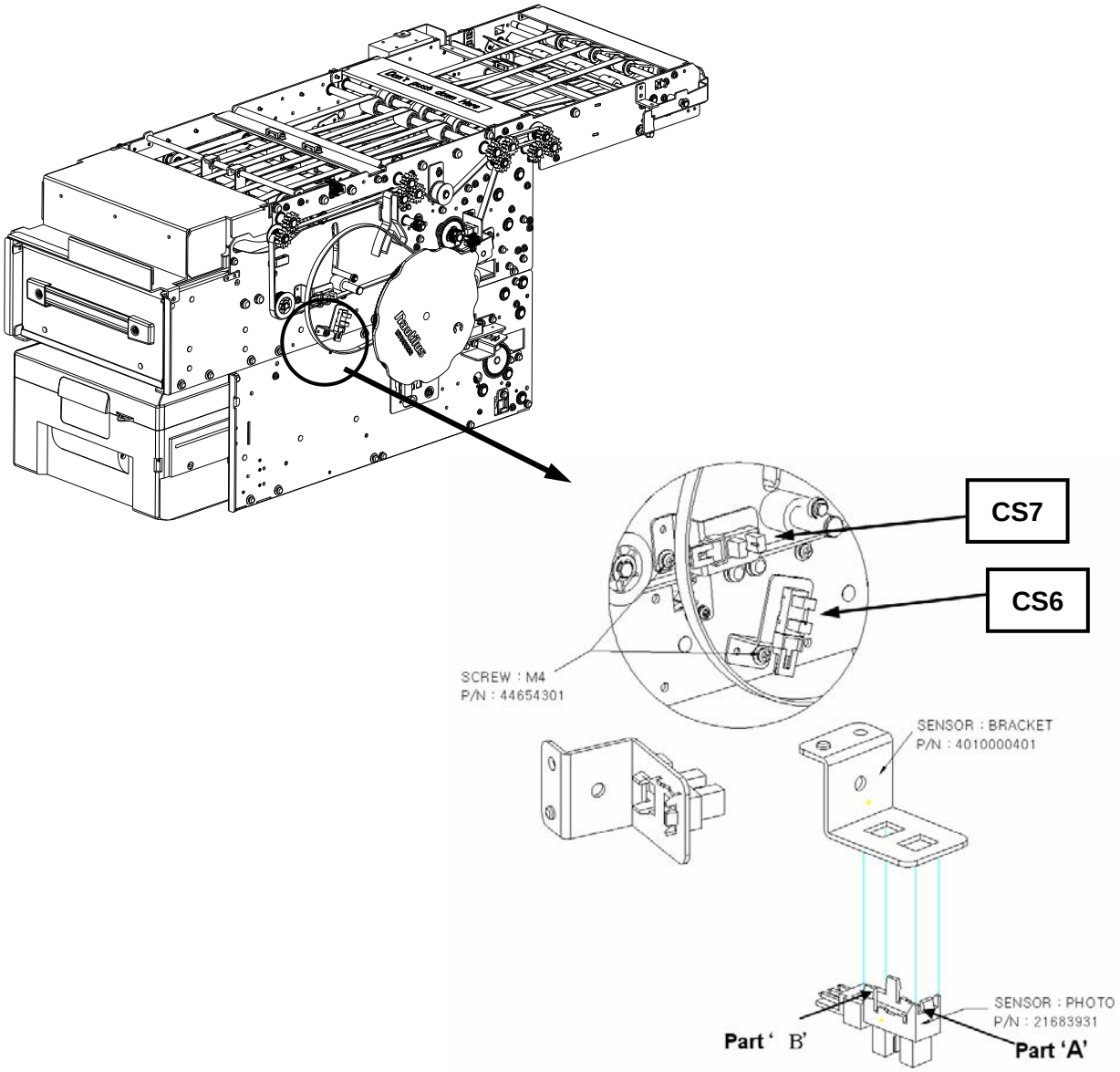
### 10) Rj/Rt Box Full Sensor_Transistor (CS9T)

① Remove the M3 fixing screw (1 place).
② Disconnect the connector. Be careful not to break the connector pin when removing.
③ Remove the sensor and replace this one.
④ Assemble in the order of ②~①.



### 11) Cam Sensor (CS6, CS7)

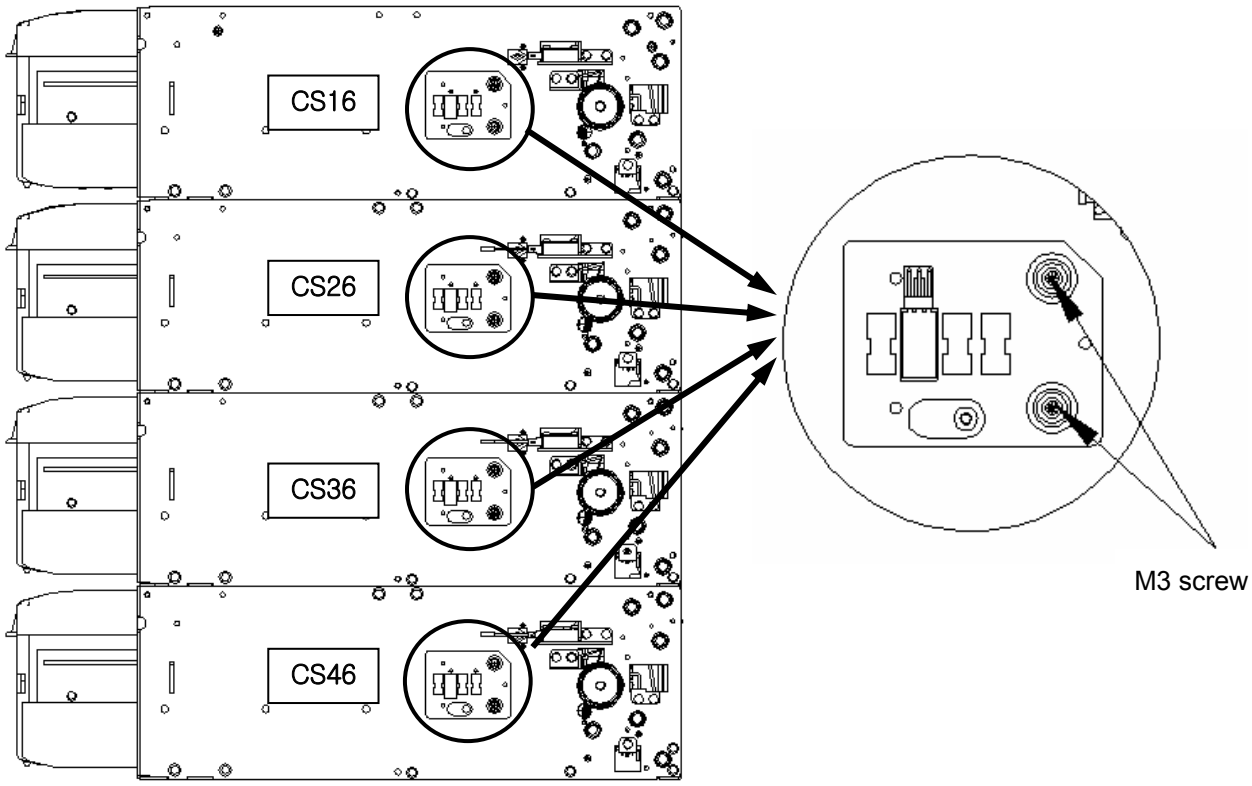
① Remove E-ring, polyslide and Cam Bracket. Then remove the M4 fixing screw of Sensor Bracket (each 1 place).
② Remove the black rubber which attached to back of the Sensor Bracket.
③ Disconnect the connector. Be careful not to break the connector pin when removing.
④ Press the part 'B' of the sensor softly as shown in the below figure to remove the lock and the sensor.
⑤ To insert the sensor, insert the part 'A' first and press the part 'B' to lock.
⑥ Assemble in the order of ④~①



### 7.5.2.2 Feed Module

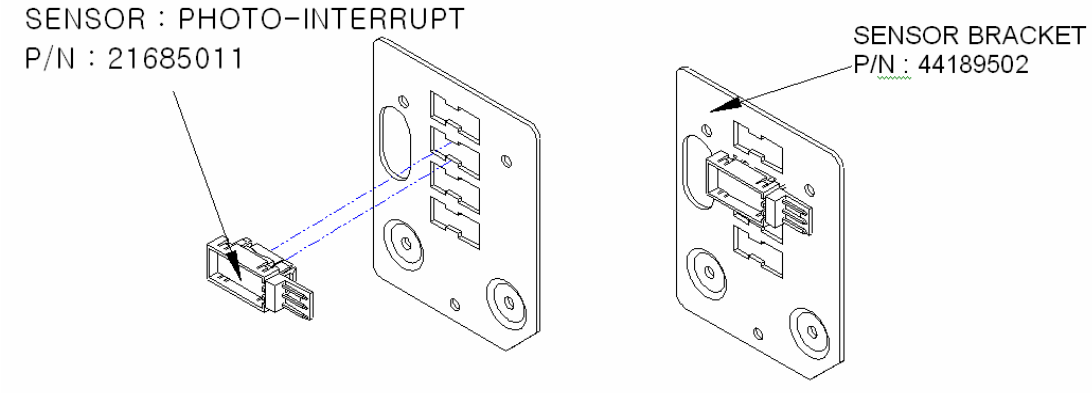
#### 1) Cash Low Sensor (CS16, CS26, CS36, CS46)

① Remove the Sensor Bracket M3 fixing screw (2 places).




② Disconnect the connector. Be careful not to break the connector pin when removing

③ Press the snap lock from the rear side of the Sensor Bracket with hands to remove.

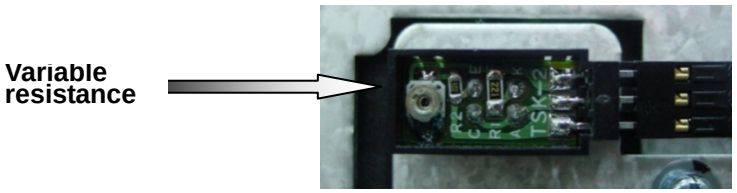


④ Replace the sensor.

⑤ Plug the connector into the sensor.

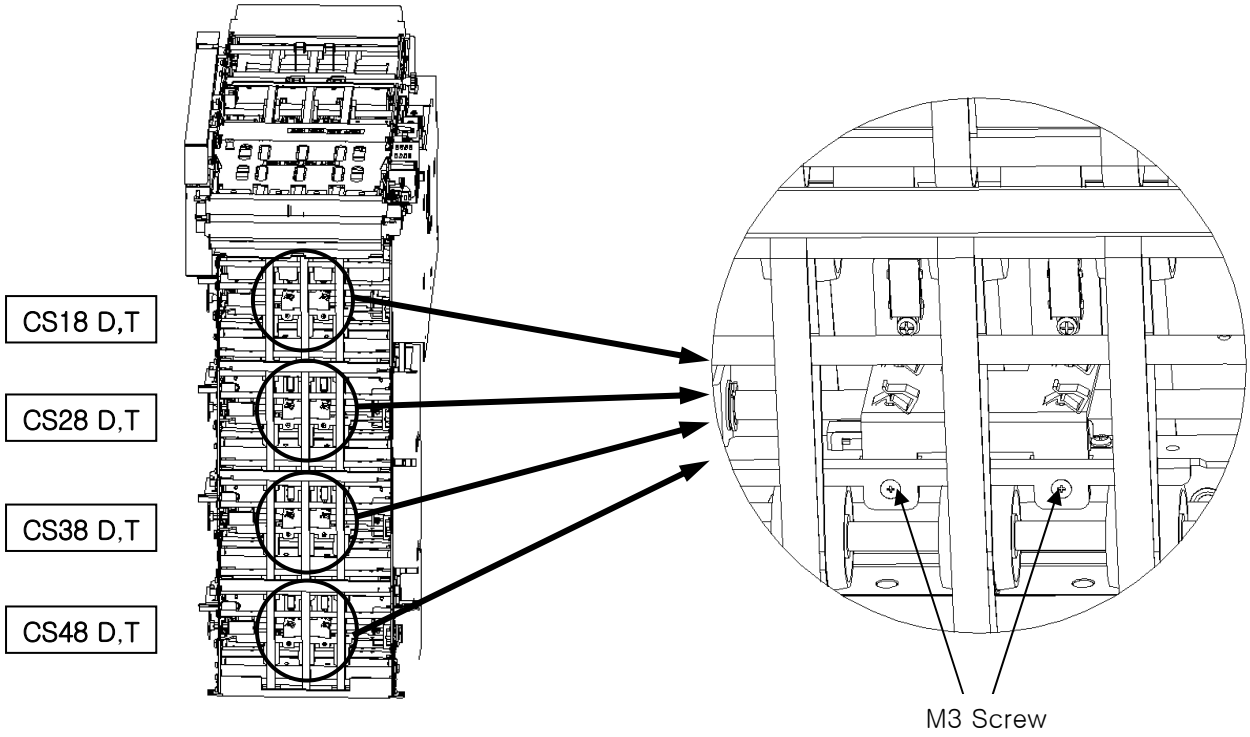
⑥ To assemble the sensor in the bracket, lock it from the front side and press the rear side to fix it.

Note) Adjust the sensor by running the variable resistance so that it generate below 1.0V if remaining amount is available. Otherwise, set it above 3.0V.



### 2) Bill Empty Sensor (CS18D,T CS 28D,T CS38D,T CS48D,T)

① Remove M3 fixing screw (each 2 places) of the Sensor Bracket.

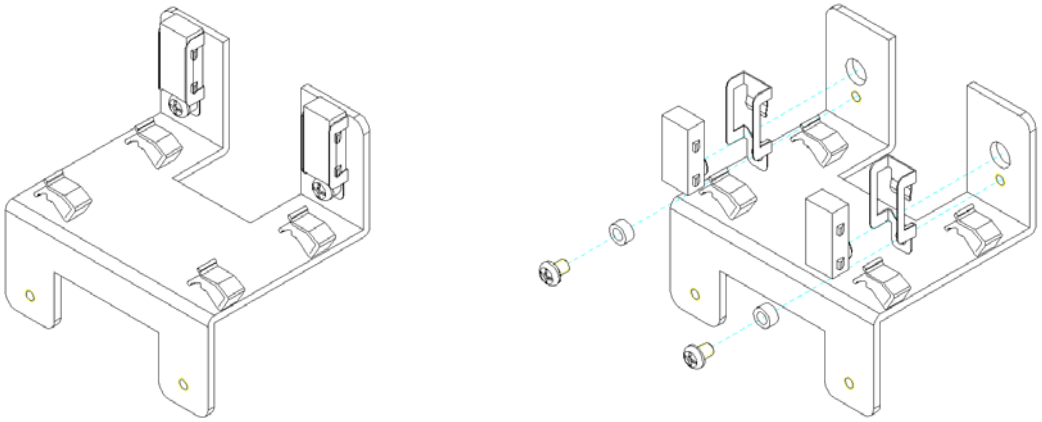



② Disconnect two connectors and take out cables from each cable tie to remove Sensor Bracket. Be careful not to break the connector pin when removing.

③ Remove M3 fixing screw (each 2 places) on the sensor to take out the sensor

④ Replace the sensor.

⑤ Assemble in the order of ③~①.

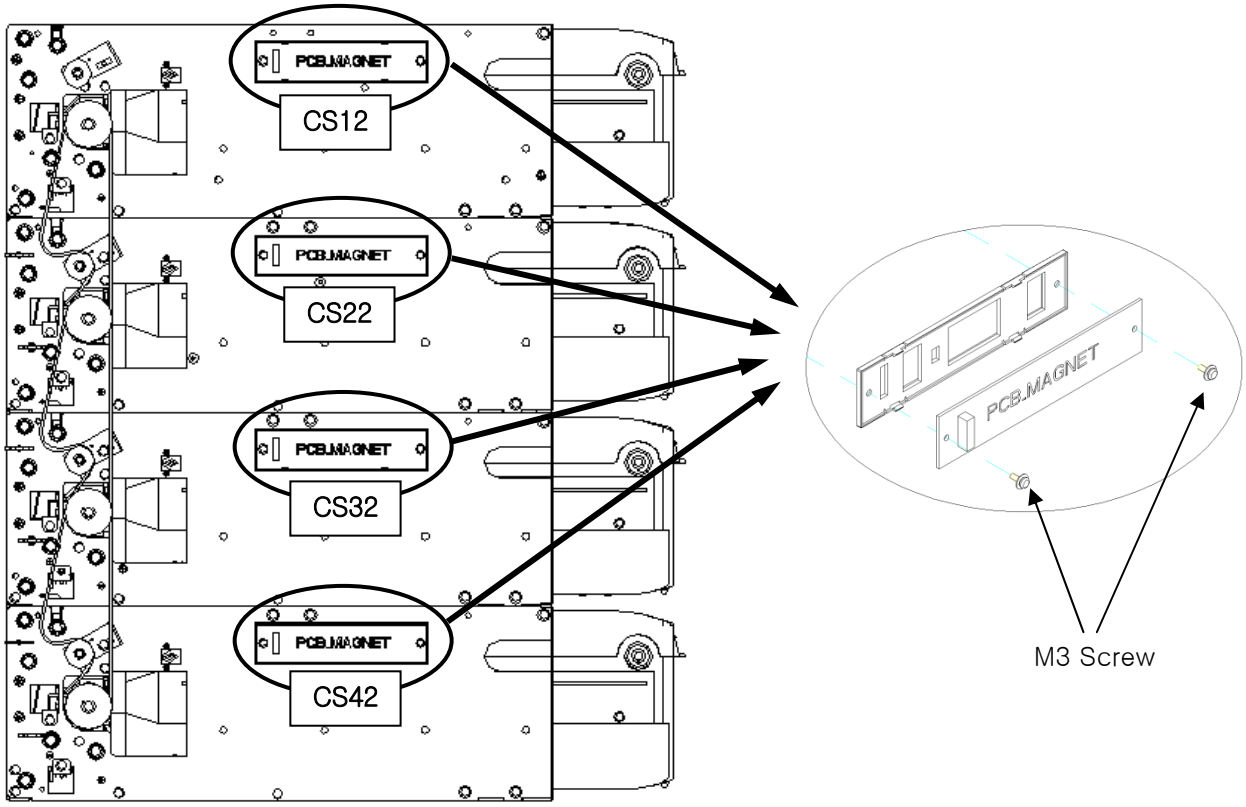


### 3) Cassette ID Sensor (CS12, CS22, CS32, CS42)

① In case of replacing the cassette identification senor(CS12) on first feeding module, you should firstly remove the main control board . In case of other feeding modules, you can skip this step.

② In case of replacing the cassette identification senor(CS22) on second feeding module, you should firstly remove the cable guide bracket. In case of other feeding modules, you can skip this step.

③ Remove M3 fixing screw (each 2 places) of the Sensor Bracket.



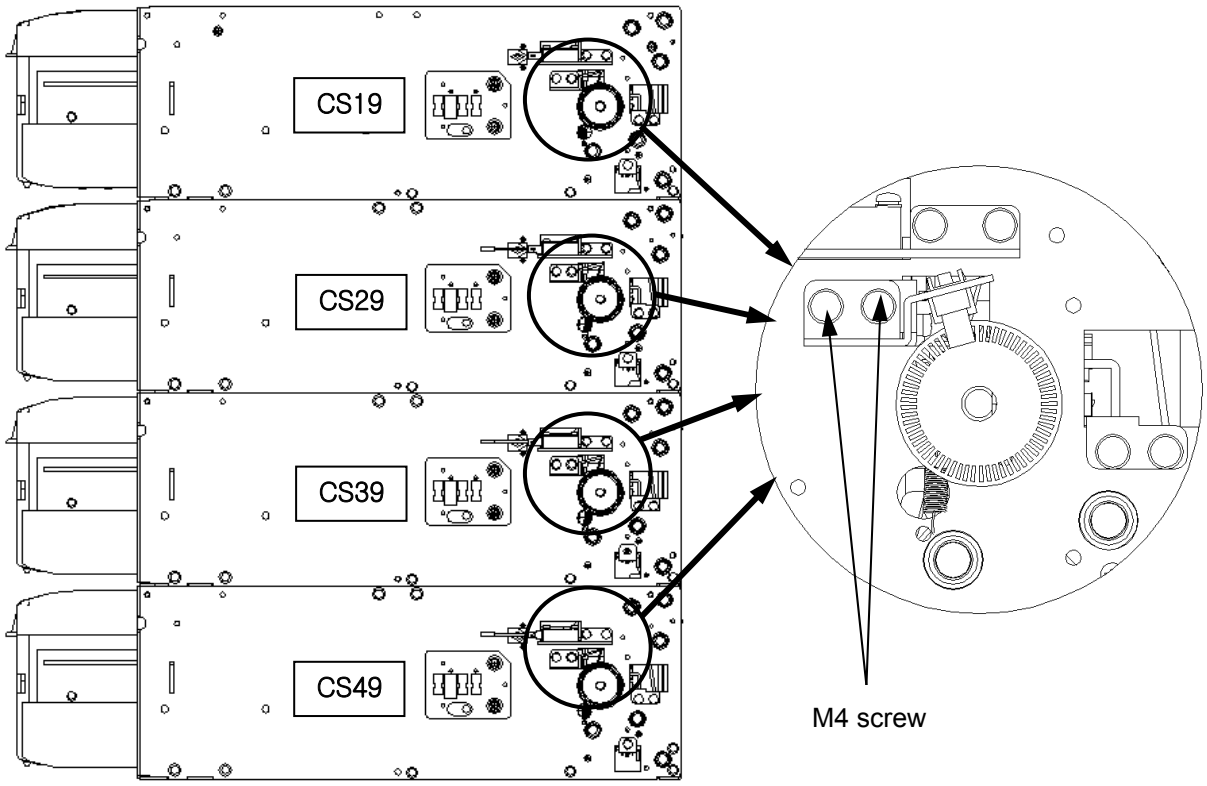

④ Disconnect the connector and then remove Sensor Plastic Mold. Be careful not to break the connector pin when removing.

⑤ Replace the sensor.

⑥ Assemble in the order of ④~①.

### 4) Clutch Encoder Sensor (CS19, CS29, CS39, CS49)

① Remove the M4 fixing screw of the CS8 Sensor Bracket (2 places).

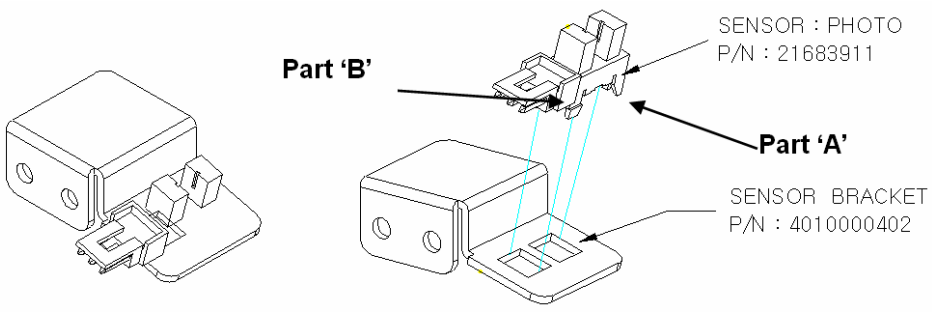



② Disconnect the connector and remove the cable tie to remove the Sensor Bracket. Be careful not to break the connector pin when removing.

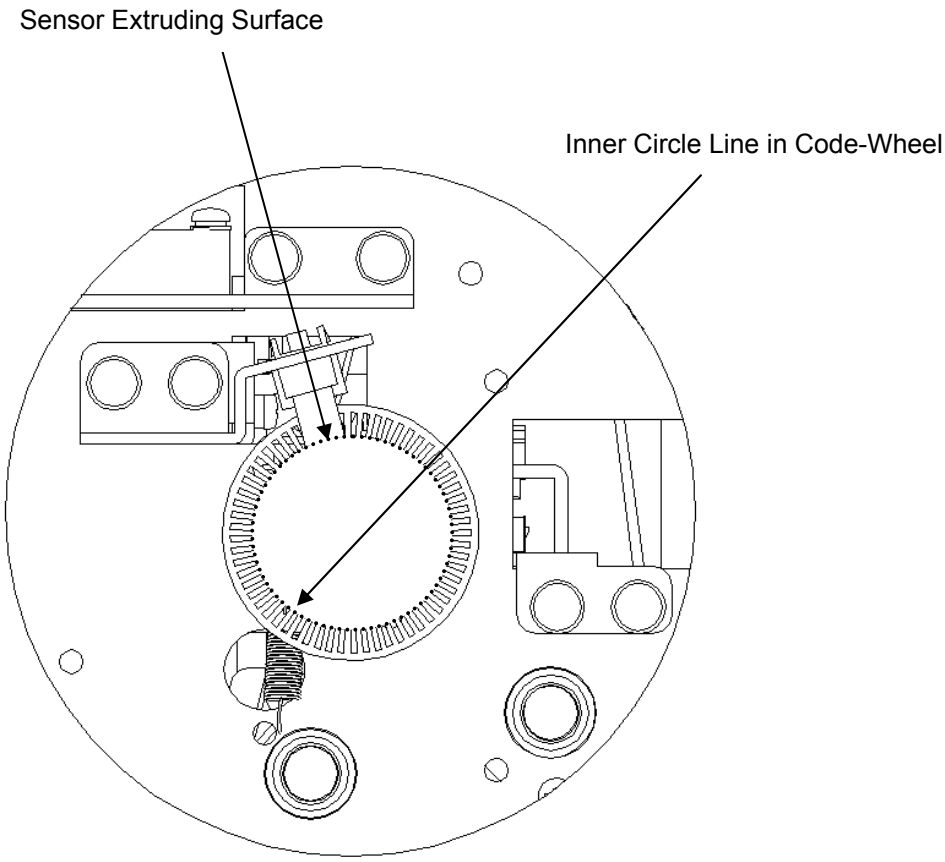
③ Press the part ② of the sensor softly as shown in the below figure to remove the lock and the sensor.

④ To insert the sensor, insert the part ① first and press the part ② to lock.

⑤ Assemble in the order of ③~①.

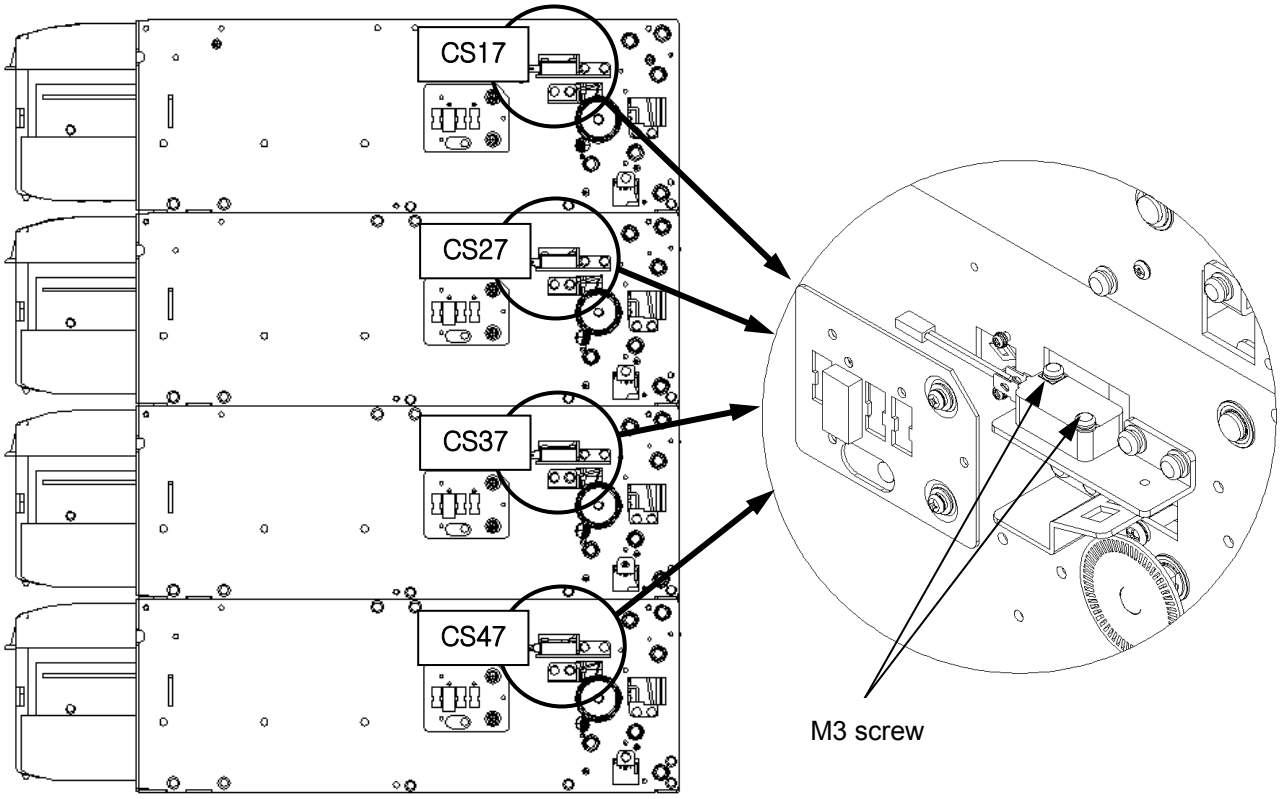


⑥ Before tightening M4 screw, make sure the inner circle line in code-wheel will vertically have same position with the sensor extruding surface by slightly adjusting Senor Bracket . After checking that, tighten screw completely.



### 5) Cassette Docking Sensor (CS17, CS27, CS37, CS47)

① Remove the Sensor M3 fixing screw (2 places).




② Disconnect the connector. Be careful not to break the connector pin when removing.

③ Replace the sensor.

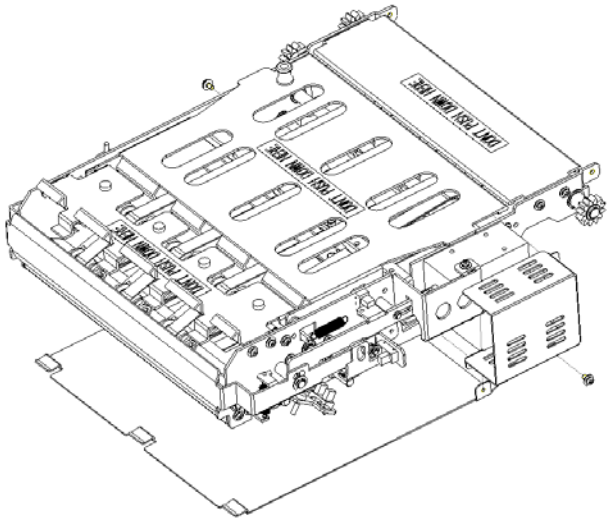
④ Assemble in the order of ②~①.

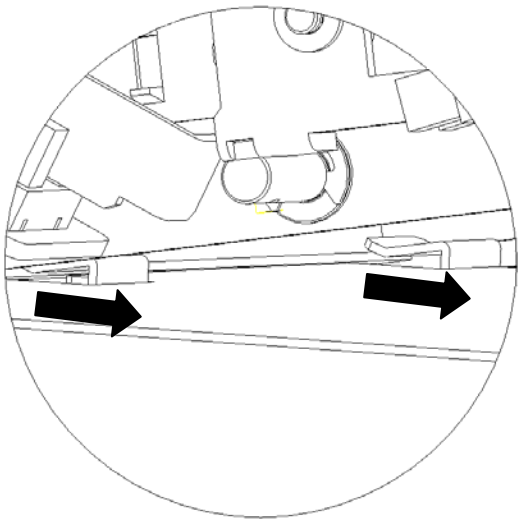
Note) Adjust cassette position when mounting it so that you can hear click sound from the switch.

### 7.5.2.3 Presenter Module

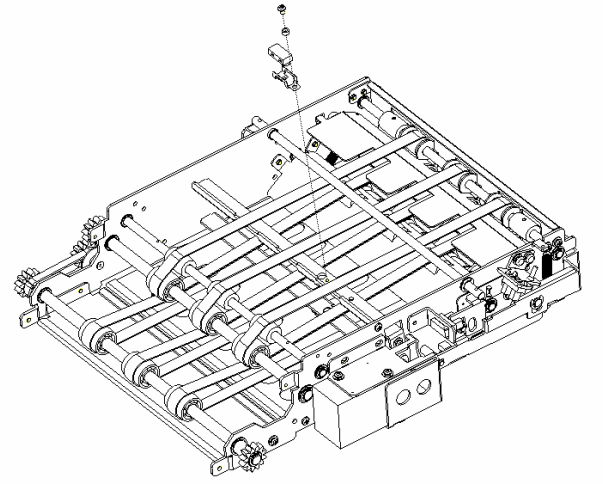
#### 1) Jam Sensor_Diode (CS14D)

① Remove the M3 screws (2 places) at both side of Presenter Bottom Cover.
② Take out the Presenter Bottom Cover by releasing locking points at Front





③ Remove the M3 sensor fixing screw from bottom direction.



④ Disconnect the connector. Be careful not to break the connector pin when removing.
⑤ Replace the sensor.
⑥ Assemble in the order of ④~①.

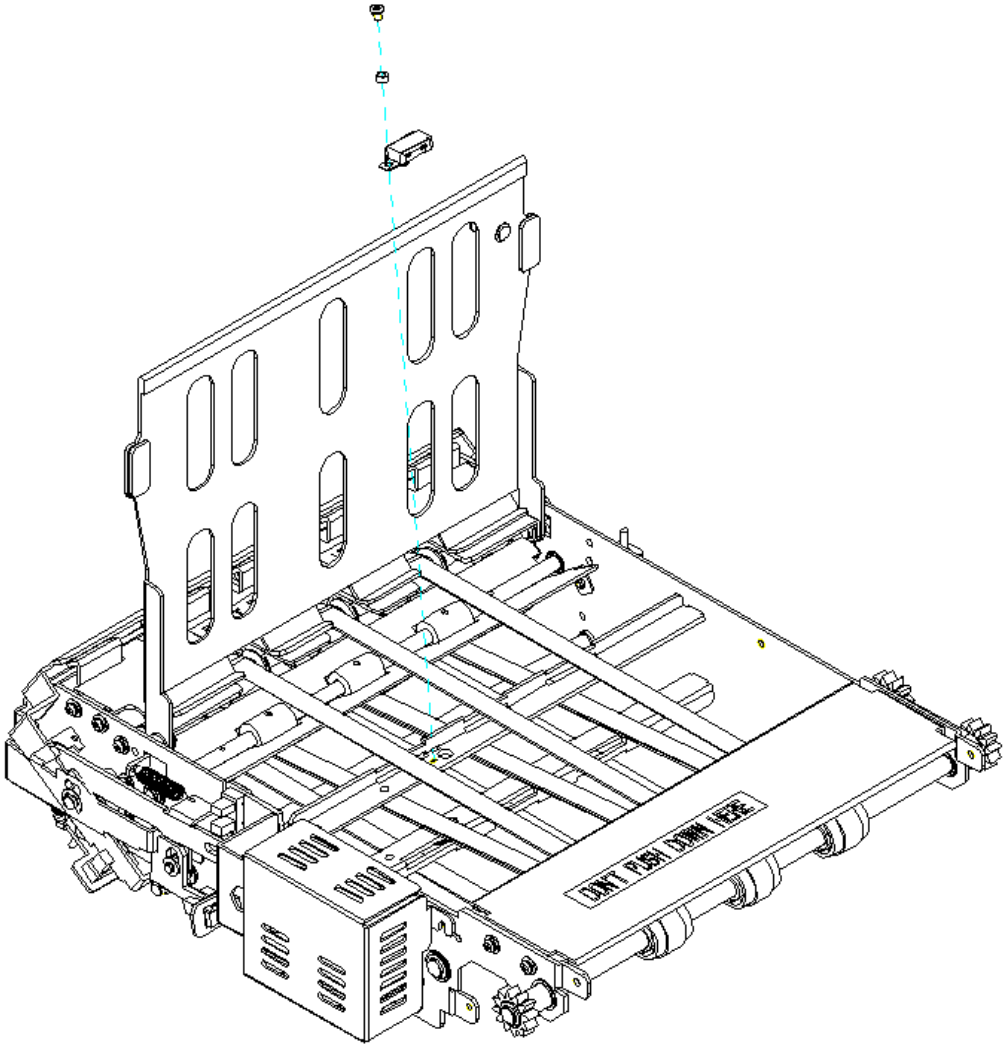
### 2) Jam Sensor_Transistor (CS14T)

① Open the Top Cover on Presenter Module

② Remove the M3 sensor fixing screw (1 pace) from Sensor Bracket and take it out.

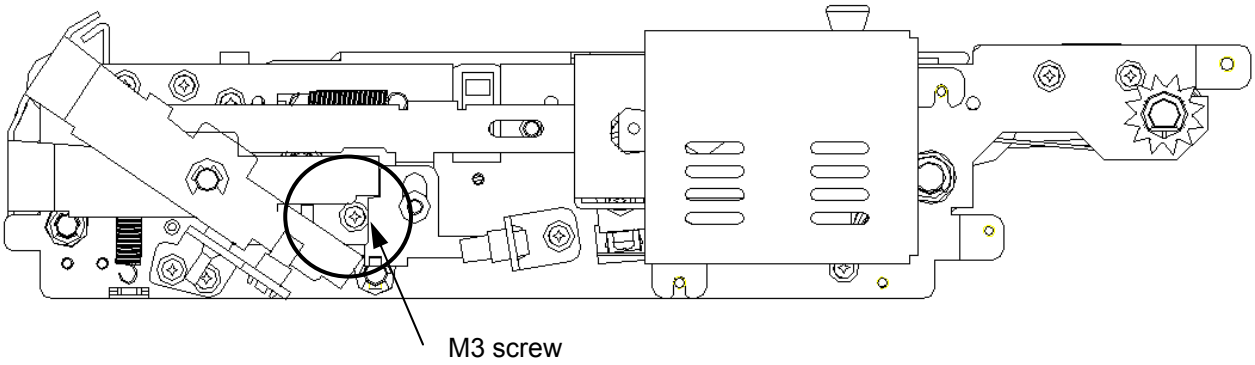
③ Replace the sensor.

④ Assemble the unit in the reverse order of ②~①.



### 3) Bill Withdrawal Sensor (CS15)

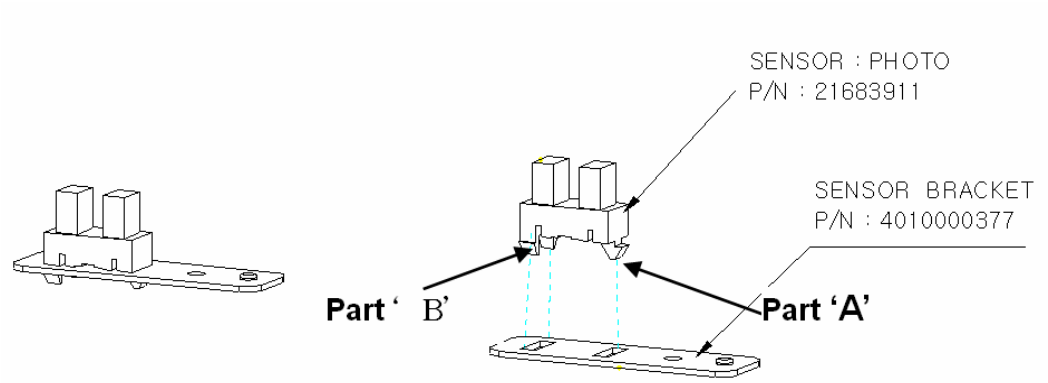
① Remove M3 fixing screw (1 place) of the Sensor Bracket.




② Open the Top Cover and disconnect the connector. Be careful not to break the connector pin when removing.

③ Remove the black rubber which attached to back of the Sensor Bracket.

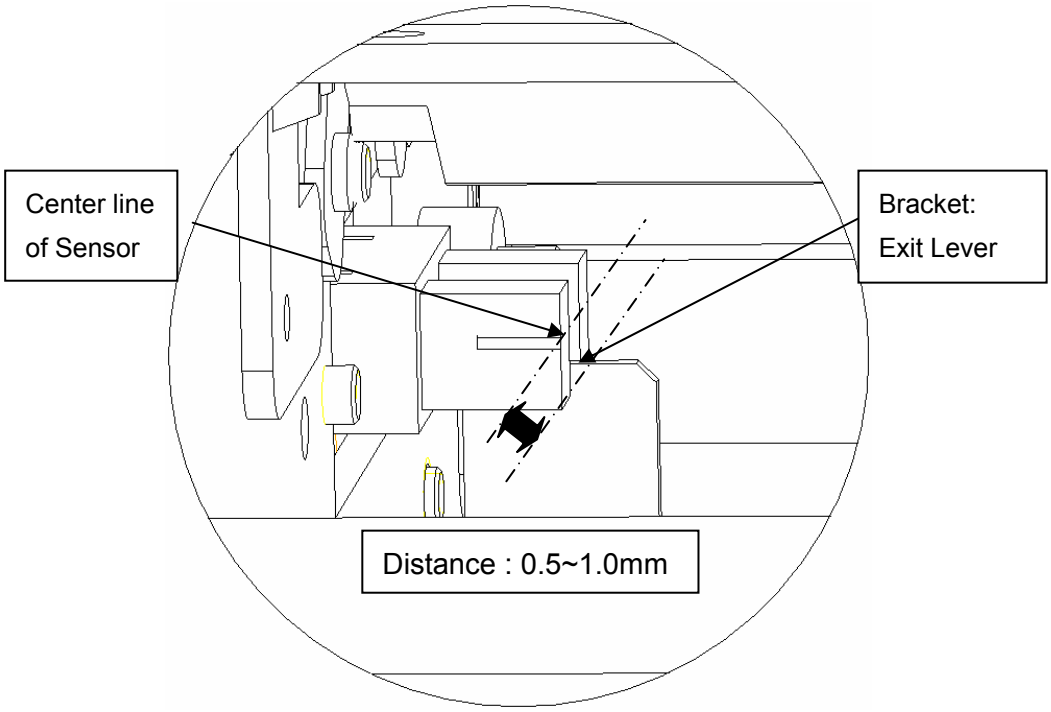
④ Press the part 'B' of the sensor softly as shown in the figure below to remove the lock and the sensor.




⑤ Replace the sensor.

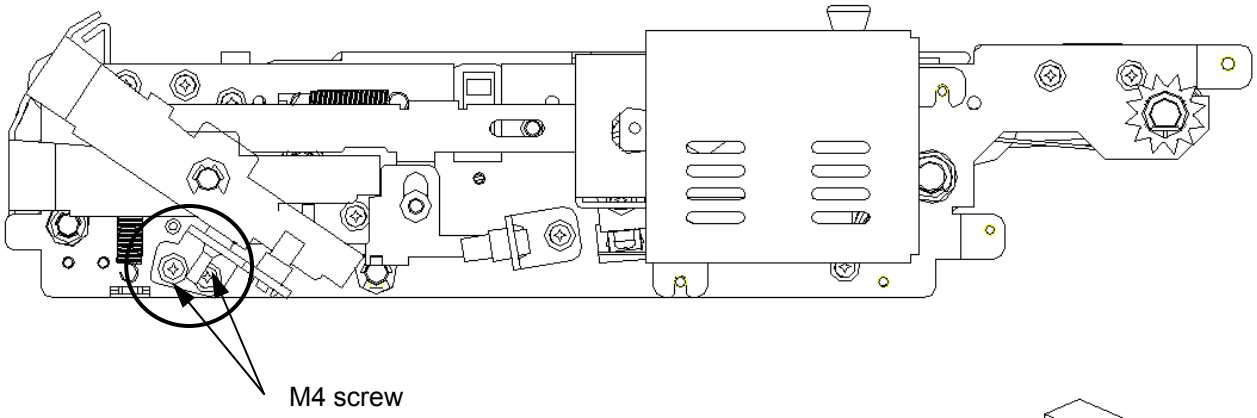
⑥ Assemble in the order of ④~①. To insert the sensor, insert the part 'A' first and press the part to lock.

⑦ Before tightening M3 screw on Sensor Bracket, make sure the Bracket:Exit Lever should be located at 0.5~1.0mm below the Sensor center line by slightly adjusting Senor Bracket.
After checking that, tighten screw completely.



### 4) Shutter Open Sensor (ST-S1)

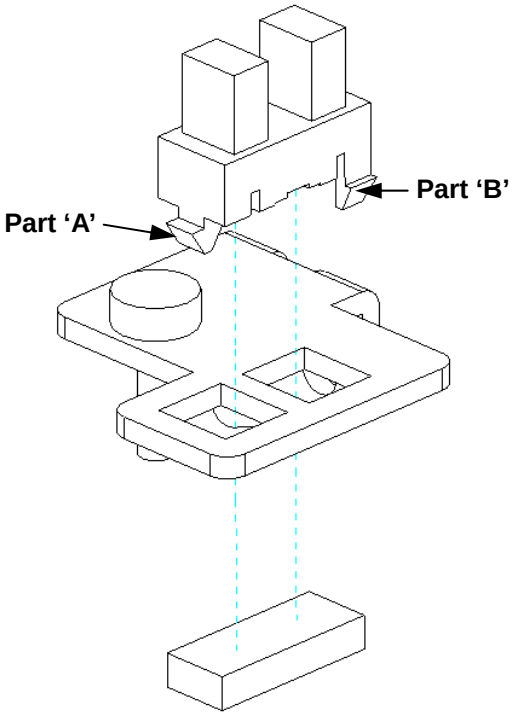
① Remove two M4 screws on the Sensor Bracket




② Disconnect the connector. Be careful not to break the connector pin when removing.

③ Remove the black rubber which attached to back of the Sensor Bracket.

④ Press the part ‘ B’ of the sensor softly as shown in the figure to remove the lock and the sensor

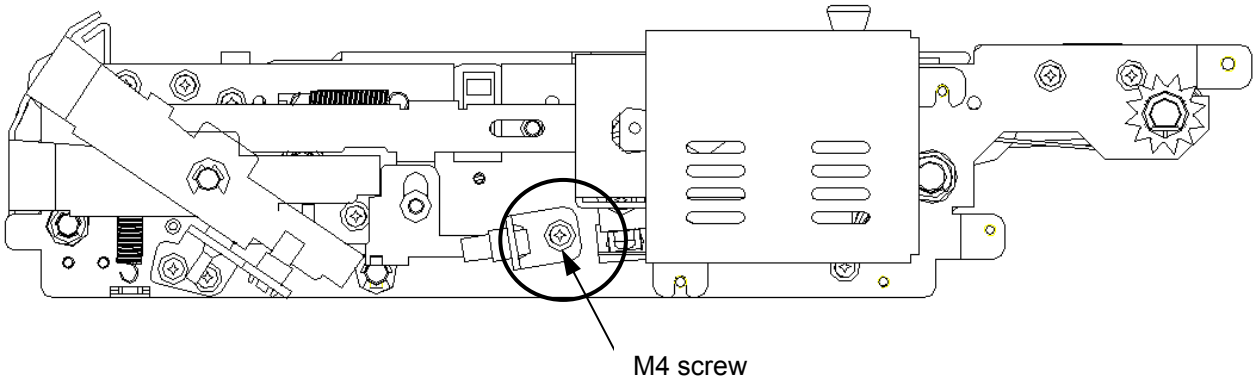



⑤ Replace the sensor.

⑥ Assemble in the order of ④~①. To insert the sensor, insert the part ‘A’ first and press the part to lock.

### 5) Shutter Close Sensor (ST-S2)

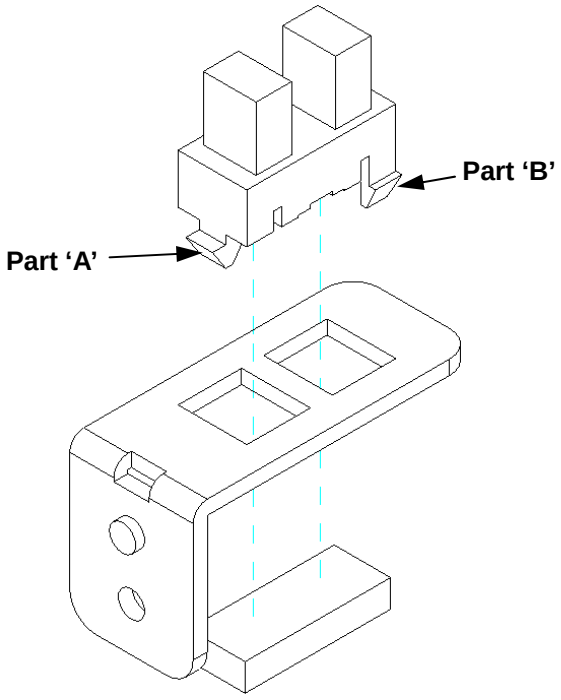
① Remove M4 screws on the Sensor Bracket




② Disconnect the connector. Be careful not to break the connector pin when removing.

③ Remove the black rubber which attached to back of the Sensor Bracket.

④ Press the part ‘ B’ of the sensor softly to remove the lock and the sensor




⑤ Replace the sensor.

⑥ Assemble in the order of ④~①. To insert the sensor, insert the part ‘A’ first and press the part to lock.

### 7.5.3 Main Control Board Replacement

① Open the safe door with password

② Turn off power at the power supply

③ Holding the green locking button on the cash dispenser and pull out the rail until the CDU is fully extended

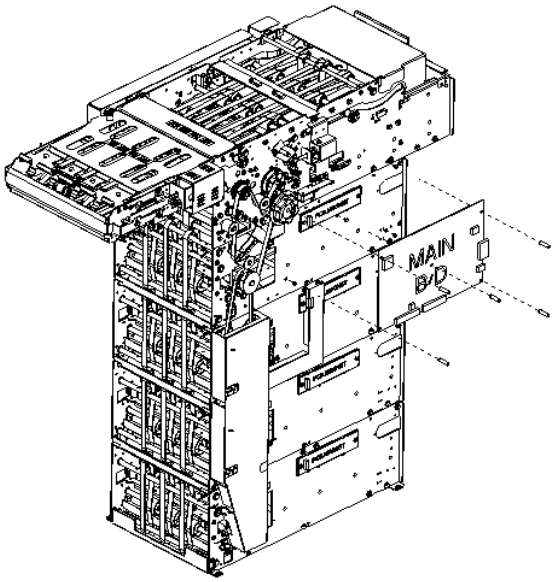
④ Remove a protective steel cover on control board by removing four screws

⑤ Disconnect the connectors from the Main Controller Board. Be careful not to break the connector pin.

⑥ Remove four M3 fixing screws.

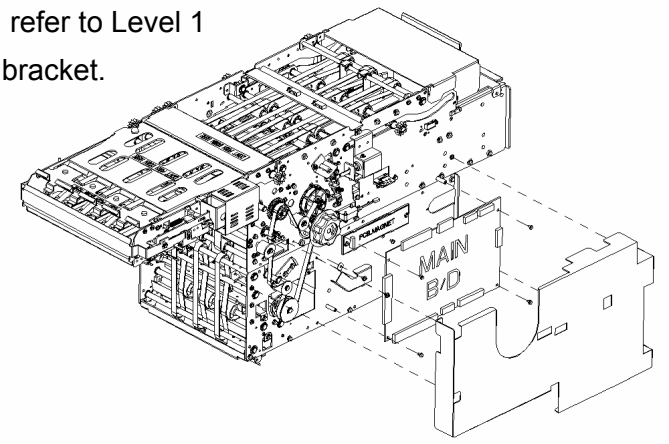
⑦ Replace Main Control board.

⑧ Take the reverse order of ⑥~① to assemble the Main Control Board

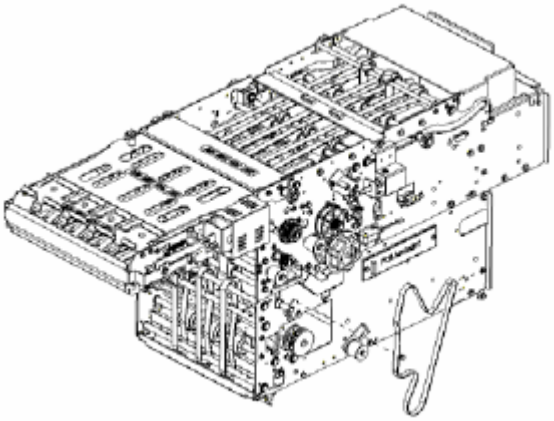


### 7.5.4 Main Body Module Replacement

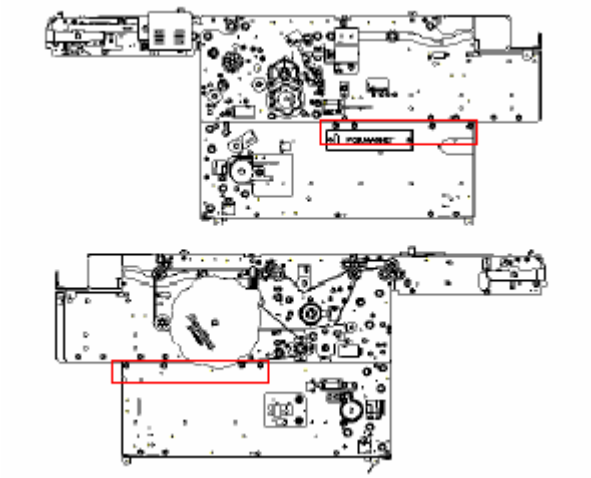
① Remove main b/d cover and main control b/d refer to Level 1
② Remove two M3 screws and the cable guide bracket.



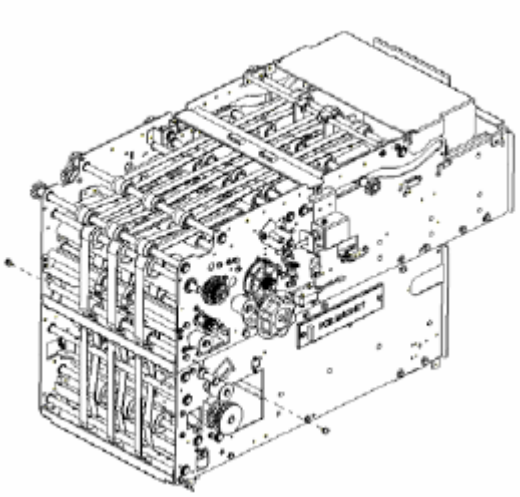

③ Remove the M4 screw and tension pulley.
④ Remove the timing belt



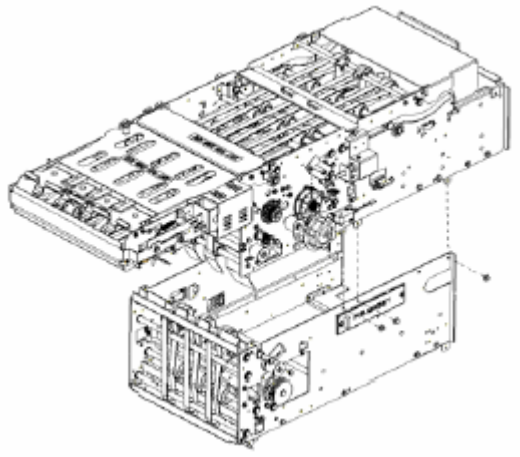
⑤ Remove M4 screws for both sides.
- Four screws for each side



⑥ Remove two M4 screws to separate main body module from fixed body base support of feed module.

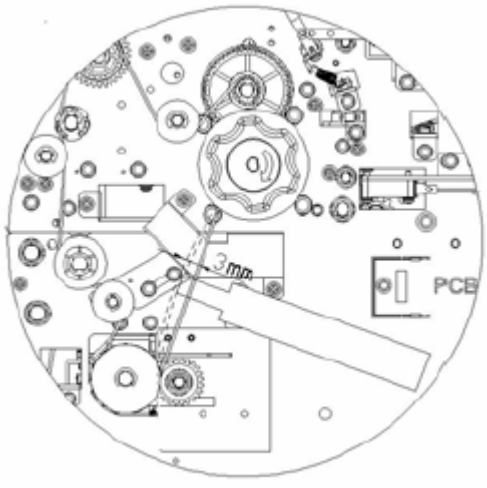


⑦ Lift up main body module and separate it from feed module.



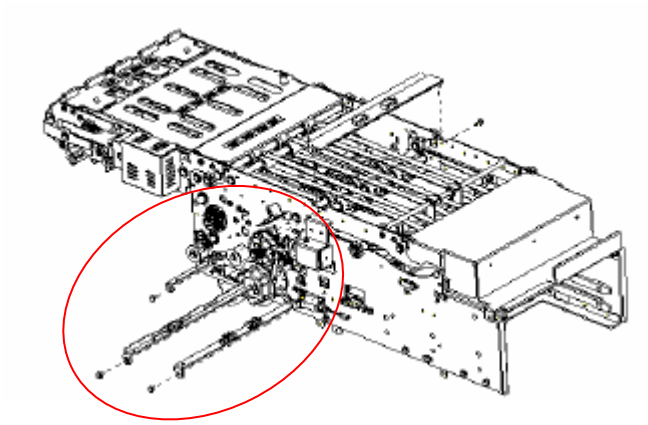
⑧ Replace the main body module and put parts back as reverse order

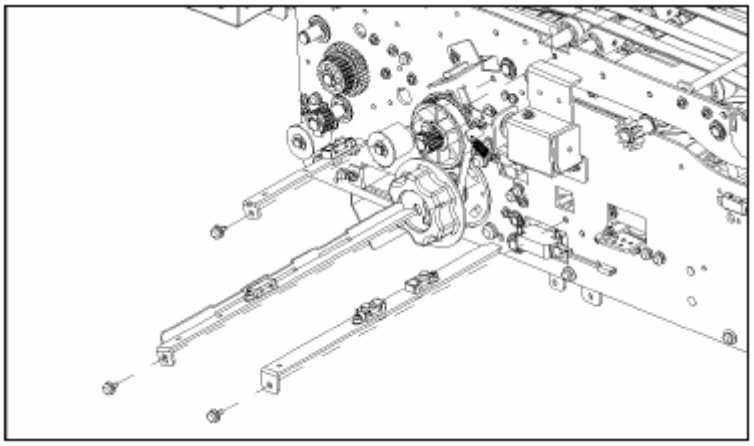
- After the reassembly, the belt tension should be 400gf~600gf when pressing 3mm in the center of the timing belt with the tension gauge.



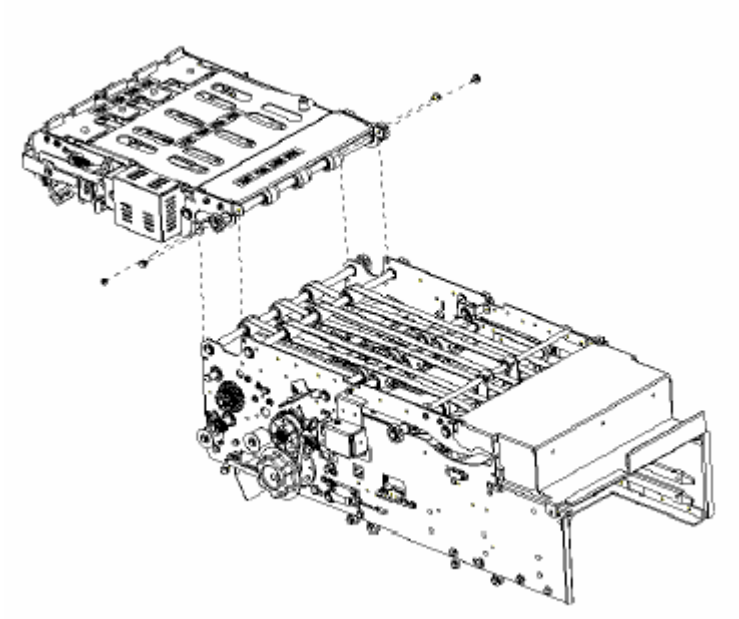
### 7.5.5 Presenter Module Replacement

① Remove main b/d cover and main control b/d refer to Level 1.
② Disconnect main sensor cable CN2 from main b/d.
③ Cut cable ties.
④ Remove five M4 screws and CS10D/T, CS13D/T sensor assembly.



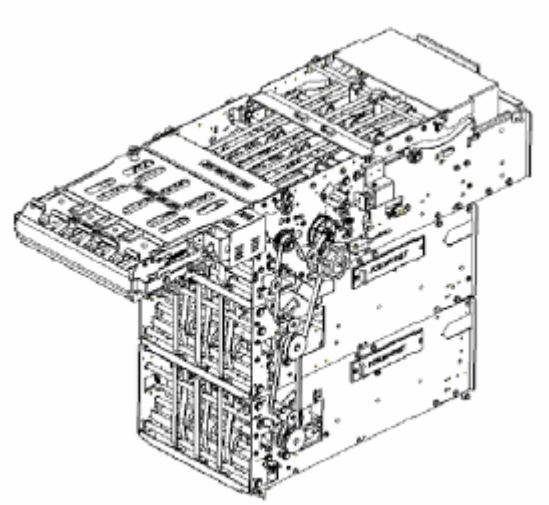


⑤ Remove two M3 screws and M4 screws.
⑥ Separate presenter assembly from main body.

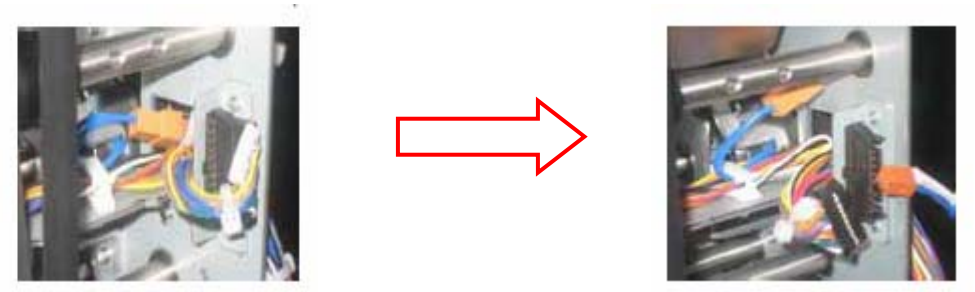


### 7.5.6 Feed Module Replacement

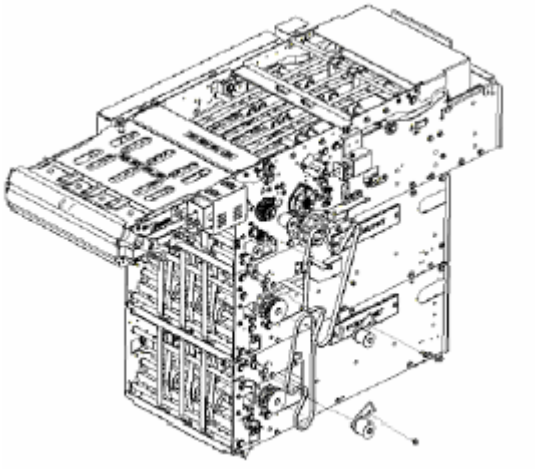
① Remove the main body module refer to 1.1
② Remove firmly tightened cable ties to make cables flexible



③ Disconnect all cable connectors for sensors in the feed module

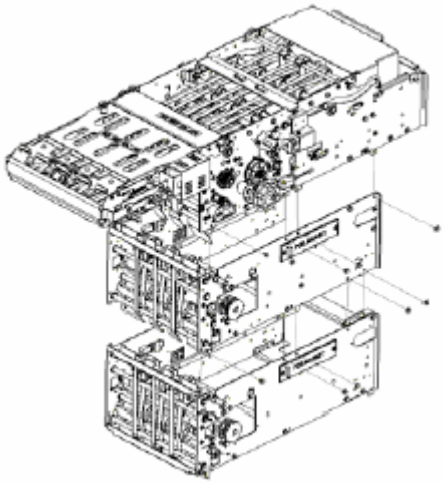


④ Remove M4 screws to remove tension pulley and timing belt
⑤ Remove M3 screws and the double detect sensor assembly cable cover

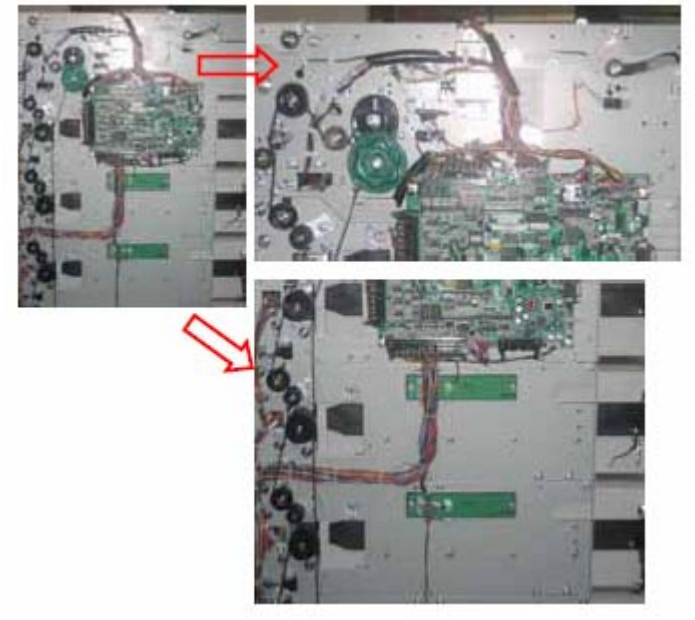


⑥ Remove all M4 screws those link upper feed module and lower feed module

⑦ Separate the upper and the lower feed modules and replace the feed module as reverse order.

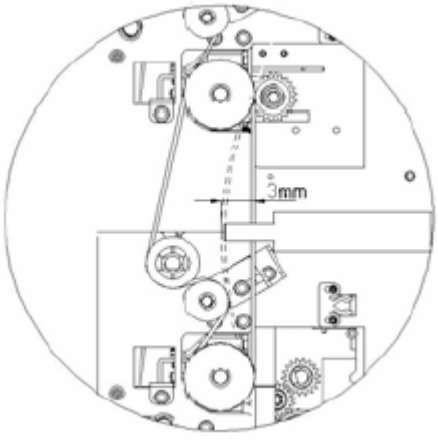


⑧ Reorganize the cables as figure and tighten cables by cable ties.

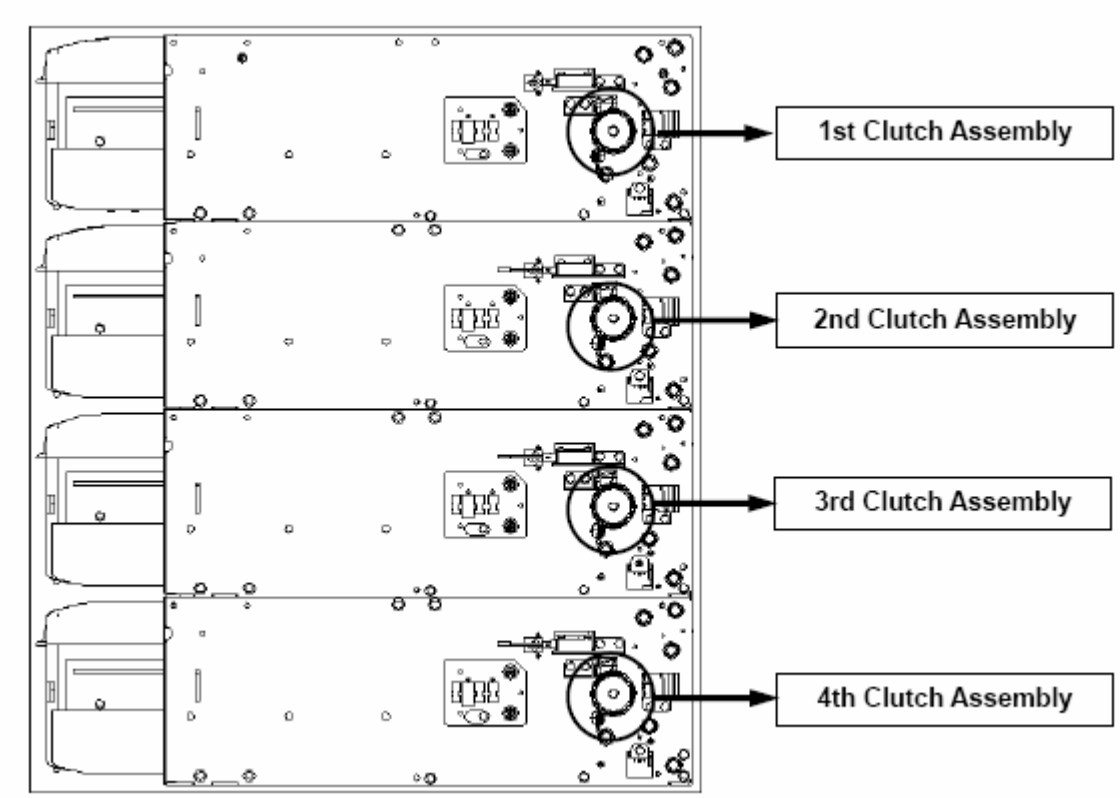


⑨ Adjust the timing belt tension.

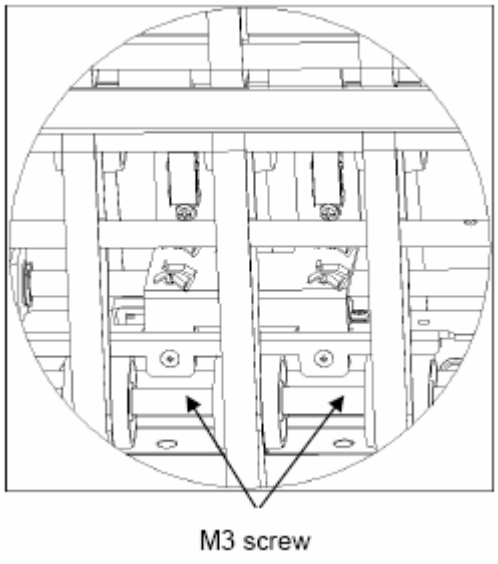
- Push the center of the timing belt 3mm using tension gauge as the figure.
- The tension should be between 400gf~600gf.



### 7.5.7 Clutch Assembly Replacement

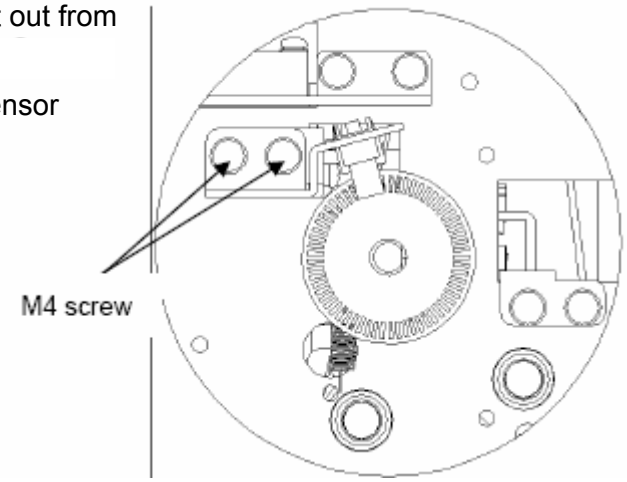



① Remove two M3 screws on Bill Empty Sensor Bracket and move it outside from Belt. Be careful not to hurt Belt at this time

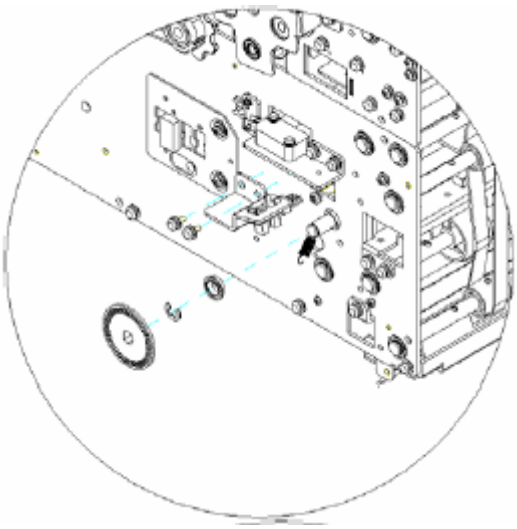


② Disconnect Clutch Assembly cable and take it out from Cable tie

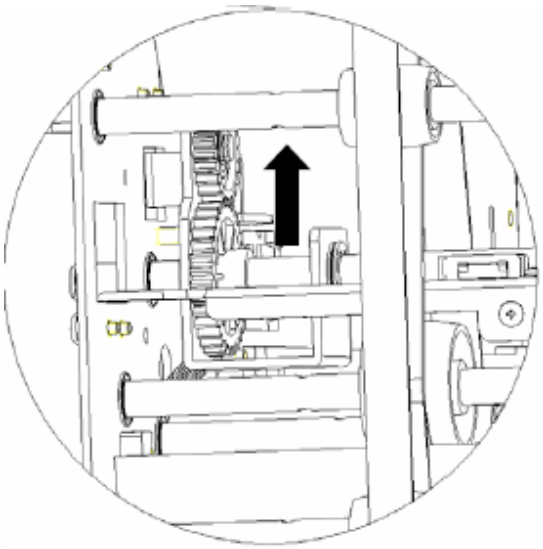
③ Loosen two M4 screws on Clutch Encoder Sensor Bracket




④ Remove Encoder wheel, E-ring, poly slider and Bearing successively. And then release the spring hook on the Side Frame.

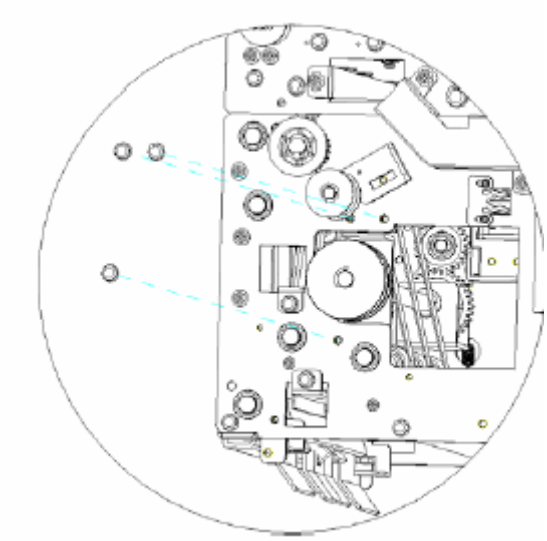


⑤ Rotate Gear Bracket into upper direction for easy disassembly

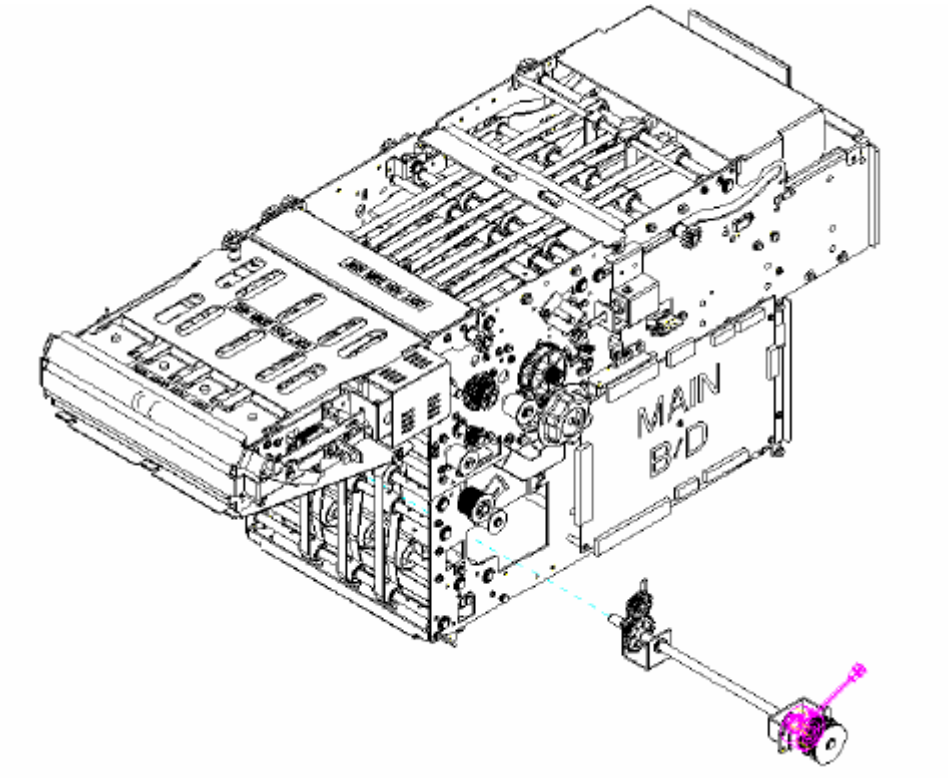


⑥ Remove Driving Belt on Feed module. Refer to Chapter 1.3 how to disassemble Driving Belt.

⑦ Remove three screws on Clutch Assembly Bracket



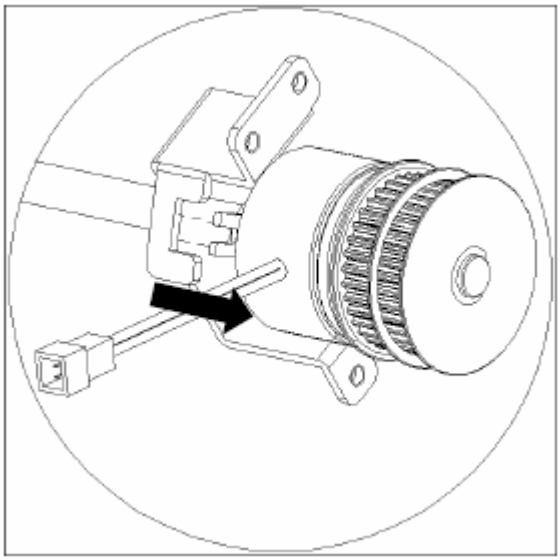
⑧ Take out Clutch Assembly outside carefully not to hurt any feed belt




⑨ Replace the Clutch Assembly

⑩ Assemble in the order of ③~①

⑪ Make sure that the ‘U’ shape of micro-clutch will be inserted the fitting feature of Clutch Supporting Bracket before fastening the screws



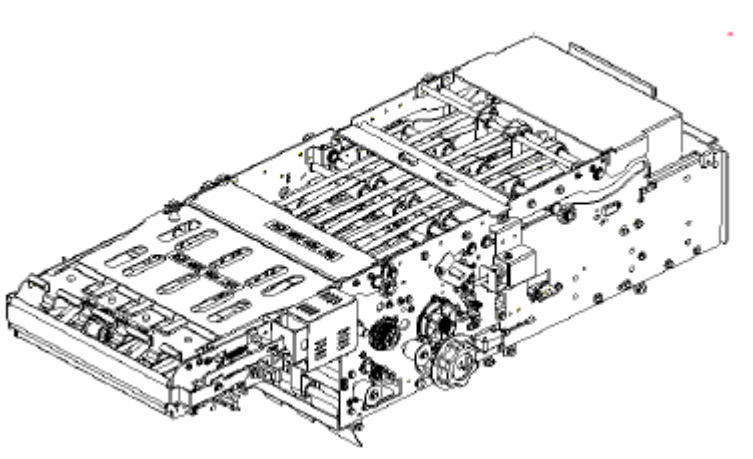
⑫ When put the driving belt back into Cash Dispenser, refer to Chapter 1.3 regarding adjustment

⑬ After the completion of Clutch Assembly, check the feed belt is properly located on roller in Feed module.

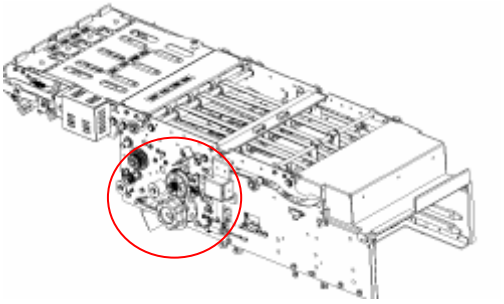
## 7.5.8 Solenoid Assembly Replacement

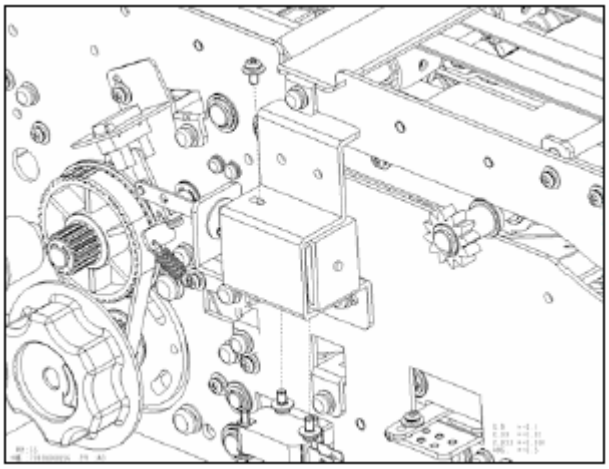
### 1) Gate Solenoid Assembly

① Remove the main control board cover.
② Disconnect the solenoid cable.

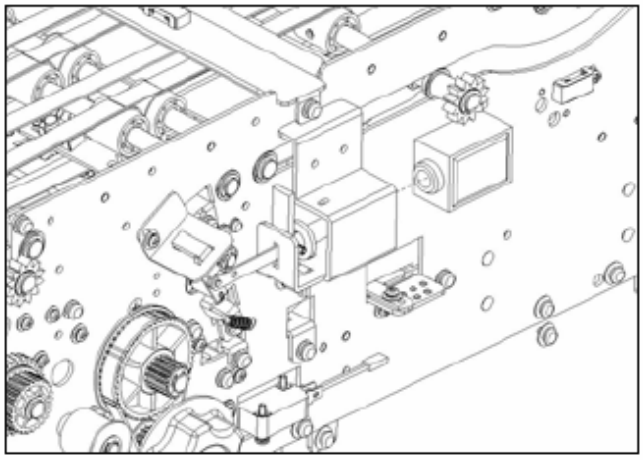


③ Remove the spring which is pulling the gate lever and the solenoid bracket
④ Remove three M3 screws





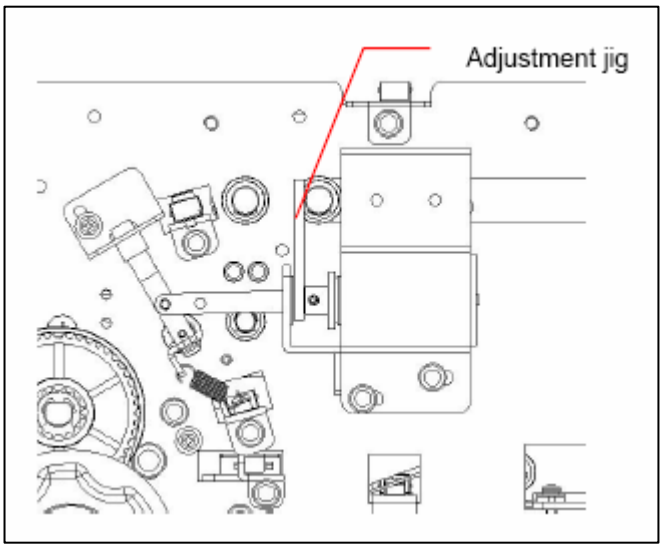
⑤ Remove the solenoid body from the plunger



⑥ Replace the solenoid body

⑦ Put the gate solenoid adjustment jig between the solenoid bracket and the plunger

⑧ Push the solenoid body and put M3 screws back and fasten

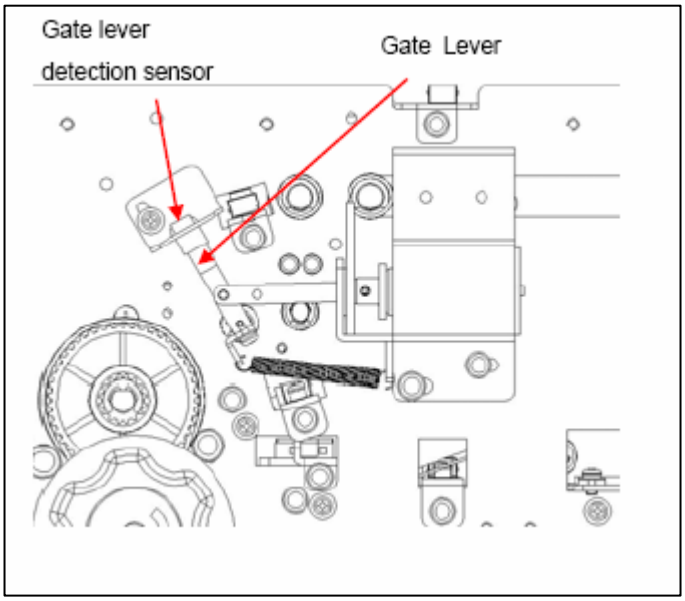



⑨ Hook the spring back

⑩ Check the gate lever whether it is located as figure when the solenoid is released

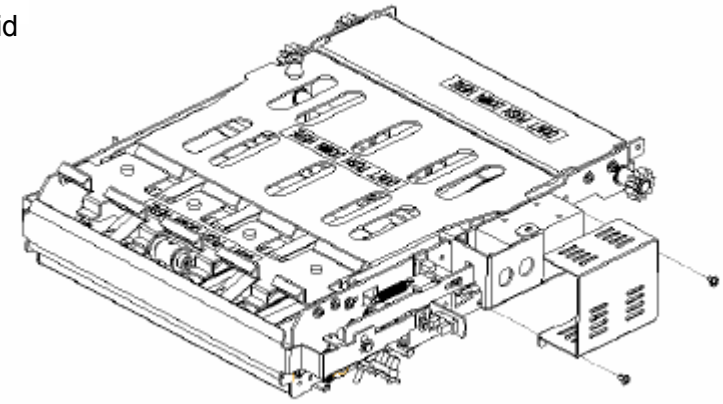
- When the solenoid is released, the gate lever should interfere the gate sensor

⑪ If the gate lever position is not correct, loosen the M3 screw and adjust gate lever detection sensor and fasten the M3 screw

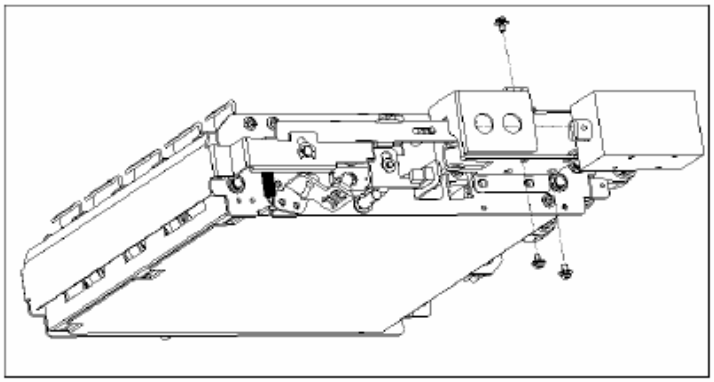


### 2) Shutter Solenoid Assembly

① Loosen two screws and remove the solenoid cover.
② Disconnect the solenoid cable.

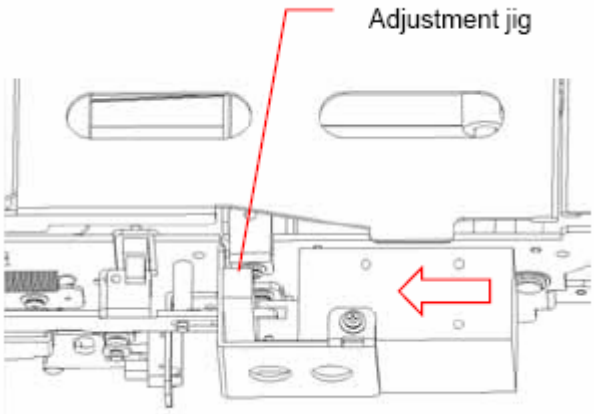


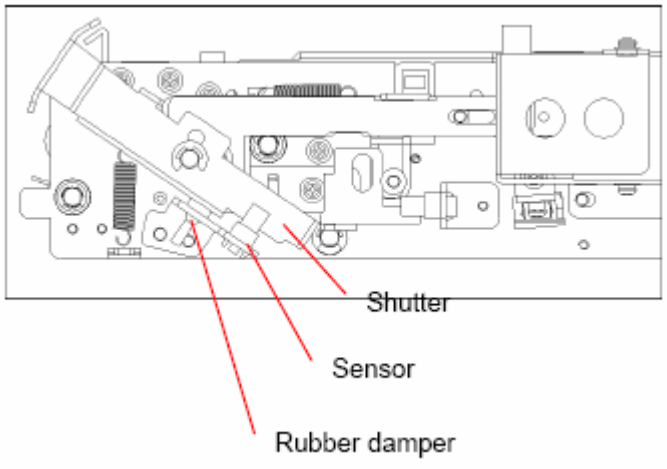
③ Remove three M3 screws and separate the solenoid body and the plunger
④ Replace the solenoid body



⑤ Adjust solenoid using shutter solenoid adjustment jig
- Put the jig between plunger and solenoid bracket
- Push the solenoid body to the bracket and put screws back to fit the solenoid body.
- When the solenoid is on, the shutter bottom should meet or be parallel to the rubber damper
- Shutter should interfere the open detection sensor.

⑥ Connector the cable connector and cover it back
⑦ Fasten two cover screws

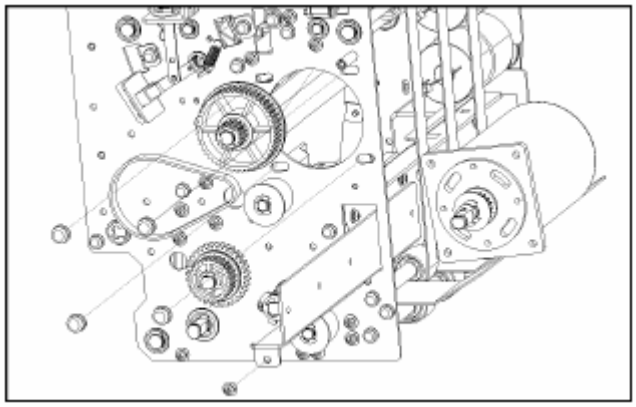


### 7.5.9 Motor Assembly Replacement

#### 1) Main Motor

①Take out one belt and electronic board connected a lot of cables
②Loosen M4 fixing screw (6 places) to separate the main module from CDU body
③Remove the cable bracket and the power cable from the main motor.
- Before remove the cable bracket, cut the cable ties and disconnect cable connectors related to it



④Remove the knob and unscrew the M5 fixing screw (3 places) of the main motor.
⑤Remove the main motor assembly and replace it. Assemble by the order of ④~ ①.

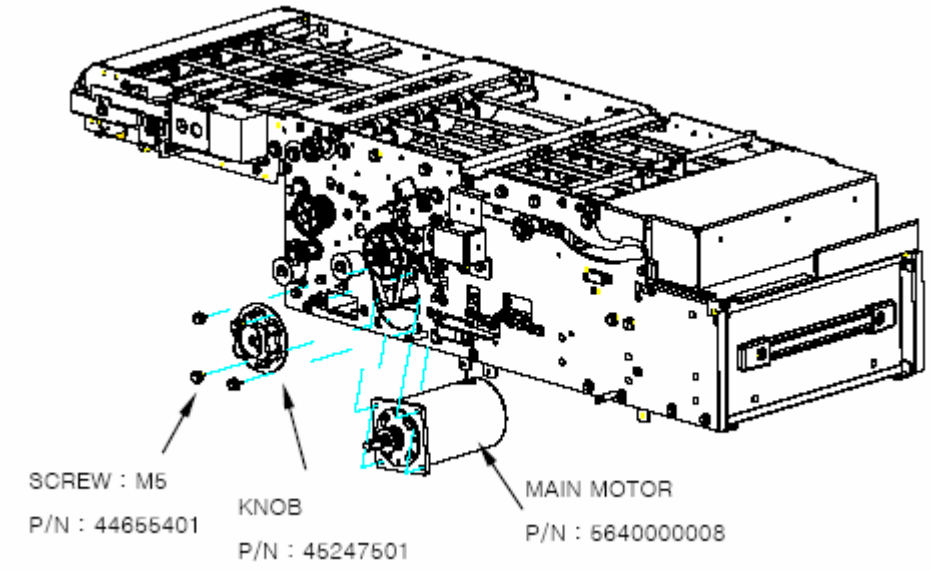
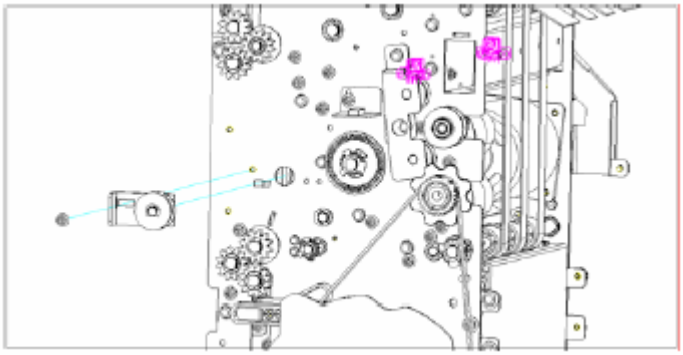
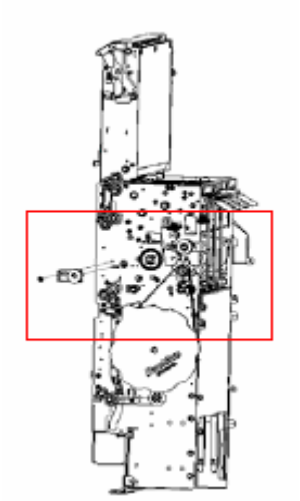



Fig.7.51 Main Motor assembly

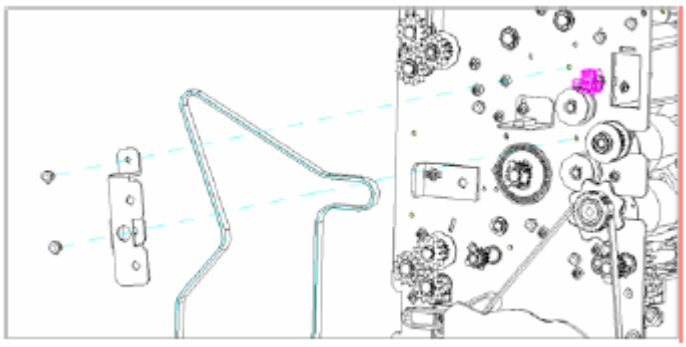
### 2) Delivery Motor

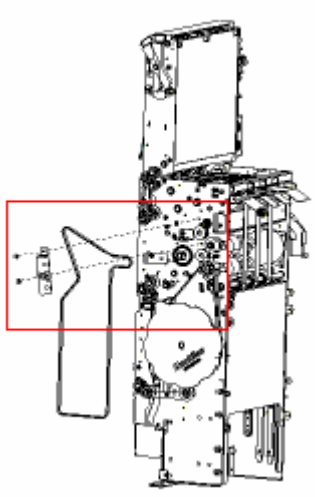
① Disassemble the main body module refer to 1.1.
② Remove the M4 screw and tension pulley.



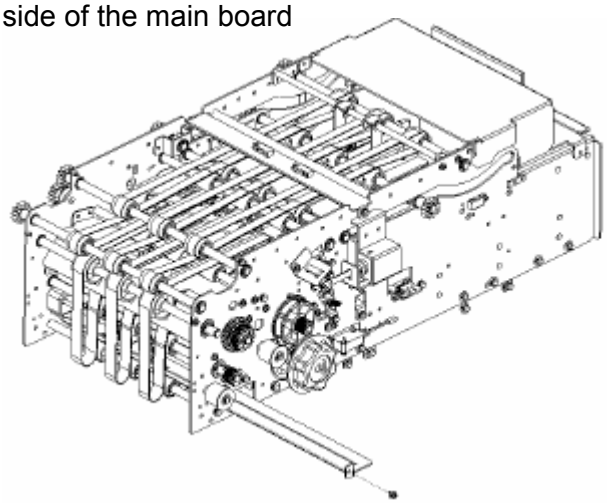


③ Remove two M4 screws and pin support bracket
④ Loosen the timing belt on the throat motor pulley



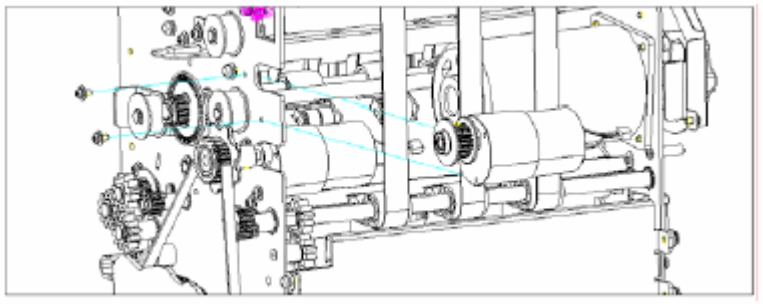


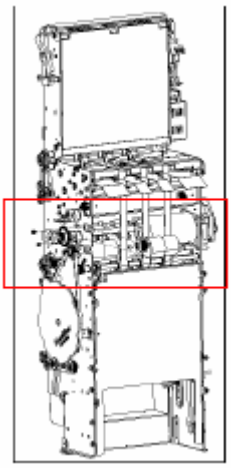
⑤ Disconnect the sensor cable
⑥ Remove the M4 screw and cable bracket assembly which is connecting the main board and the sensors on the opposite side of the main board



⑦ Remove two M3 screws and replace throat motor assembly

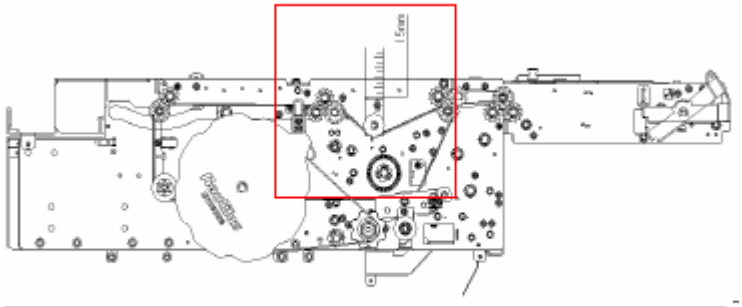
⑧ Put all disassembled parts back as reverse order

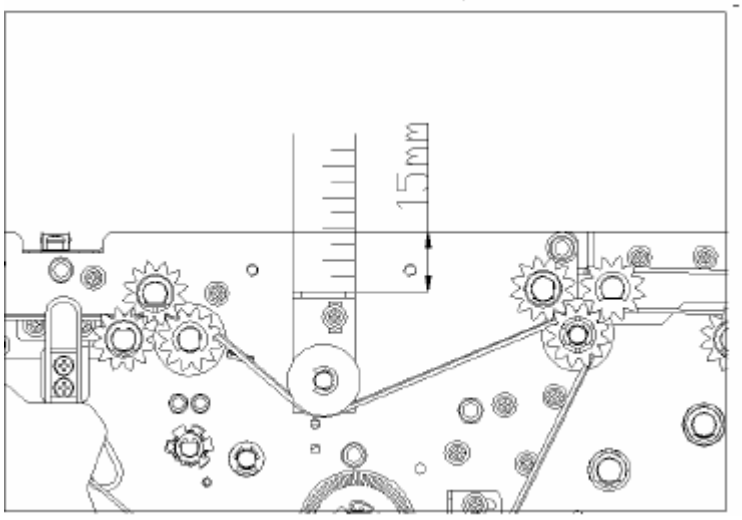




⑨ Adjust the timing belt tension

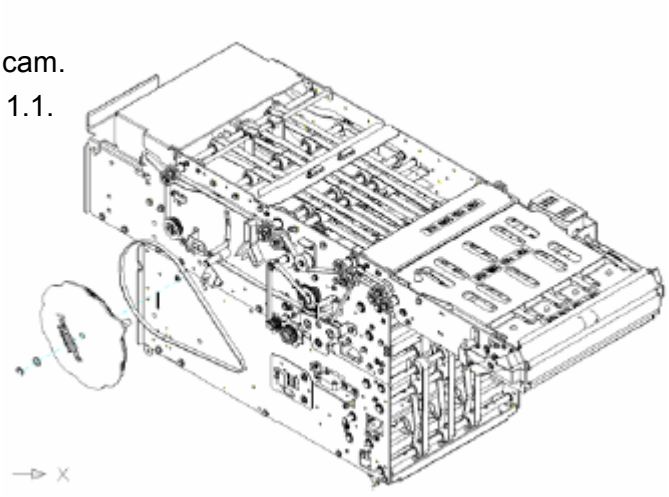
- The distance from the frame top edge to tension pulley top edge is 15mm



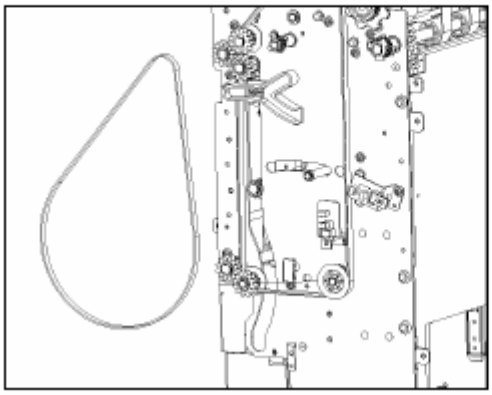


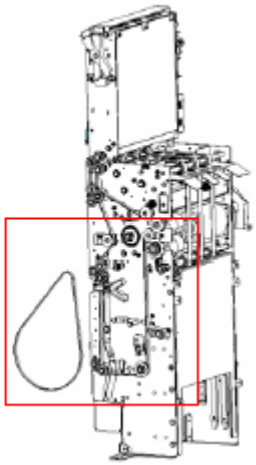
### 3) Cam Motor Assembly

① Remove the 6phi E-ring, poly slider and cam.
② Separate the main body module refer to 1.1.

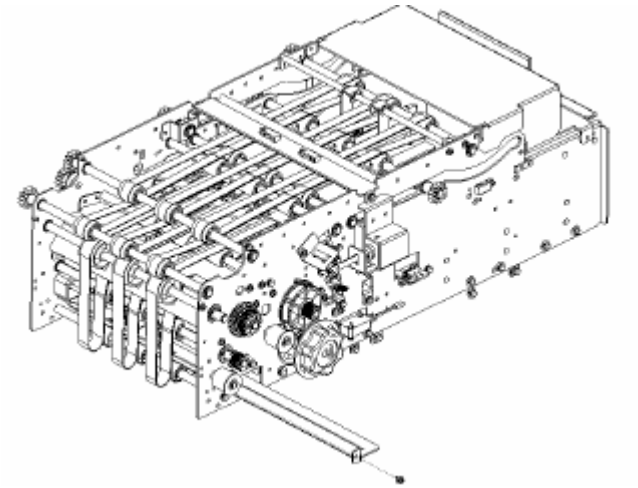


③ Remove the timing belt



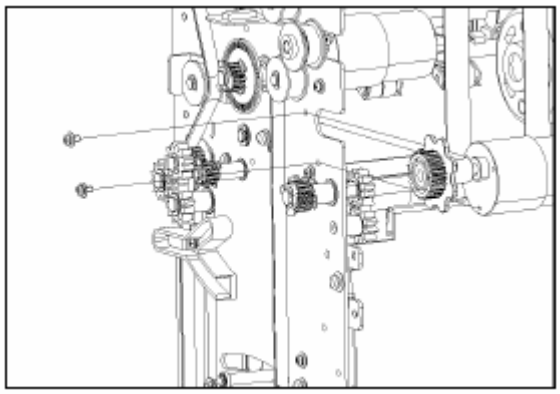


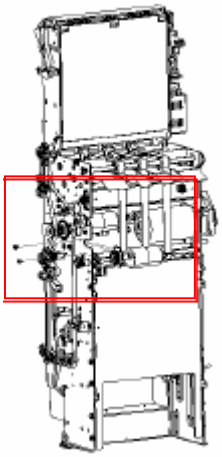
④ Disconnect the sensor cable
⑤ Remove the M4 screw and cable bracket assembly which is connecting the main board and the sensors on the opposite side of the main board



⑥ Remove two M3 screws and replace cam motor assembly.

⑦ Put parts back as reverse.

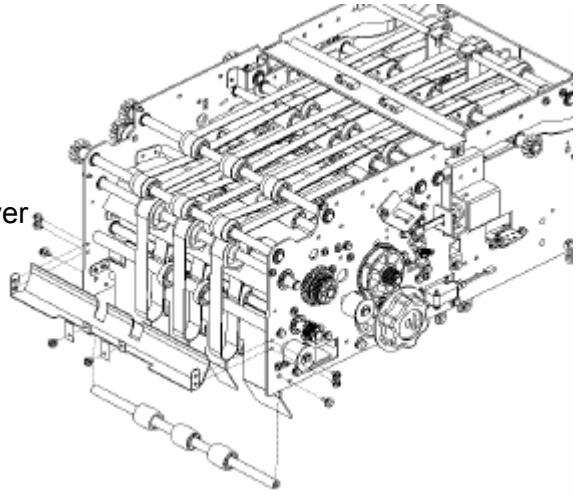




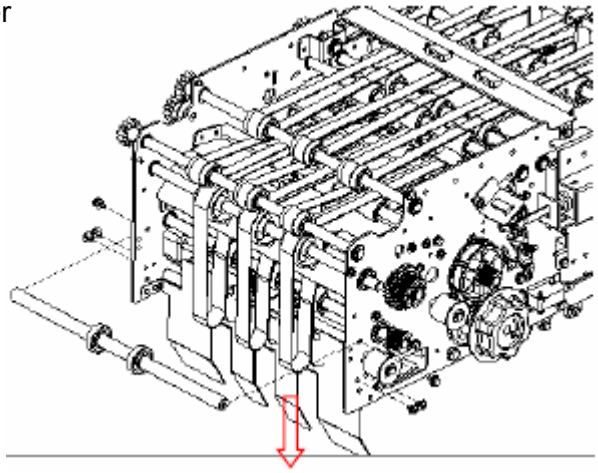
## 7.5.10 Sub-Assembly Replacement

### 1) Assy: Double Detection Sensor

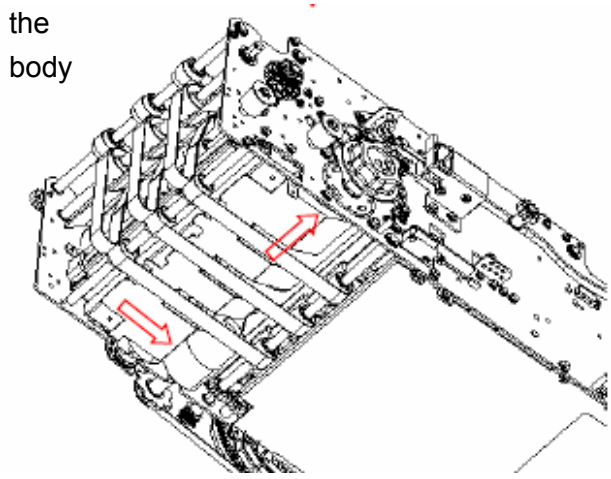
① Separate the main body module refer to 1.1 and the presenter module refer to 1.2.
② Remove two M4 screws and idle tension roller assembly.
③ Remove four M3 screws and double detect lever support assembly.



④ Remove two M4 screws and double detect lever support roller assembly.
⑤ Remove four M3 screws and slide the double detect guide assembly to the arrow direction.



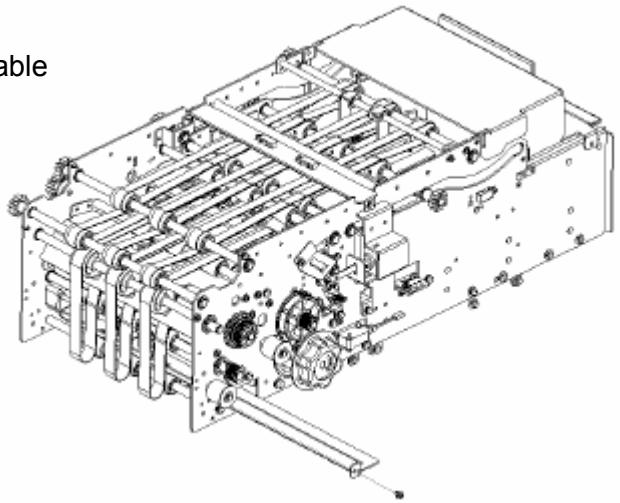
⑥ Slide the double detect guide assembly to the arrow direction and remove from the main body module.



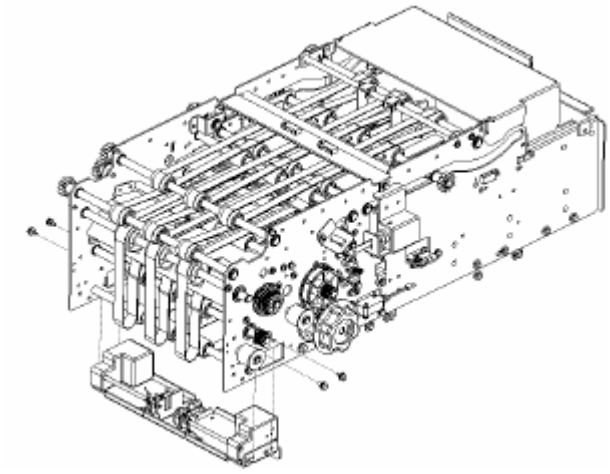
⑦ Disconnect two double detect lever(DBL) assembly cable connectors
- Cut cable ties which tie up the presenter motor cable and the TSK motor cable

⑧ Disconnect the sensor cable assembly(CN33)

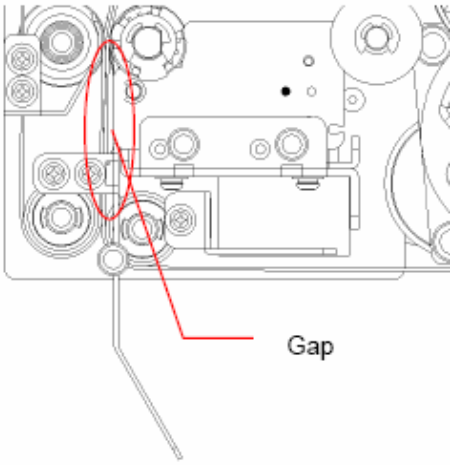
⑨ Remove the M4 screw and remove cable bracket with cable assembly



⑩ Remove four M4 screws and double detect lever assembly
- When removing the DBL assembly, it should be careful not to cut the cables



⑪ Replace DBL assembly and put parts back as reverse order
- Double detect guide assembly surface should not touch the belts (Gap between DBL guide and belts)



## 7.5.11 Cassette Assembly

### 1) Latch

① Open the cassette cover and pull back the push plate to lock.

② Loosen latch bracket M3 screw (2 places) as shown in the figure and remove it from the cassette body.

③ Press the latch snap lock with hands to remove the latch from the latch bracket.

④ Replace the latch.

⑤ Assemble in the order of ③~①.

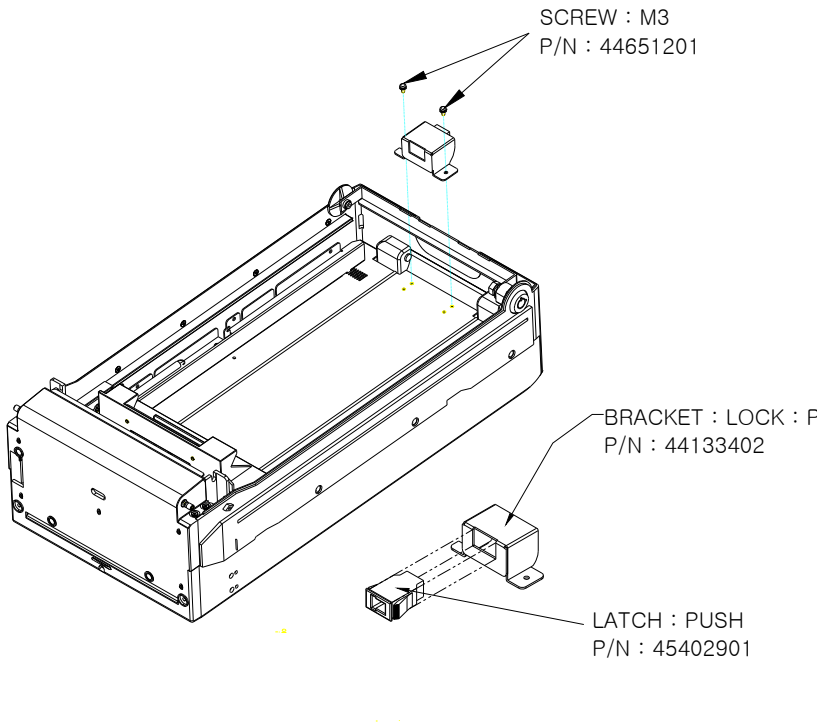



Fig. 7.48

**2) Push Plate**

① Open the cassette cover and pull back the push plate to lock.

② Loosen push plate M3 screw (2 places) as shown in the figure and remove it from the cassette body. Remove the spring connected to the push plat hole at the same time.

③ Replace the push plate.

④ Assemble in the order of ②~①. Adjust the push plate groove to the push plate guide in time of assembly.

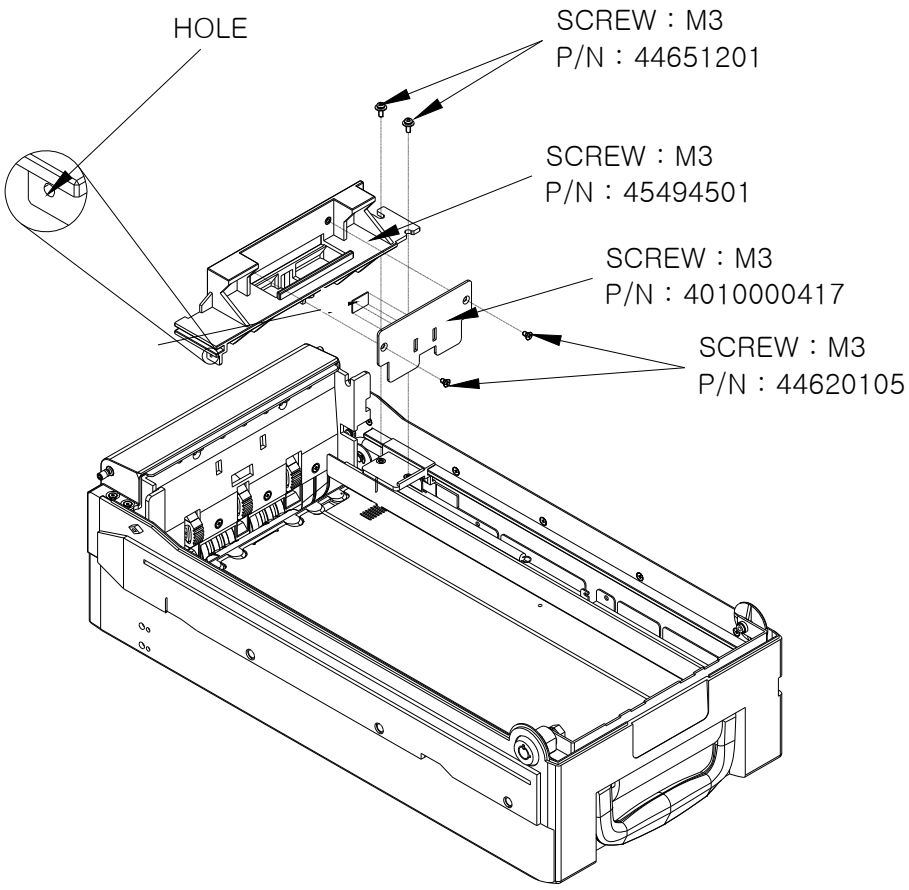



Fig. 7.49

### 3) Side Guide and Upper Guide

① Open the cassette cover and pull back the push plate to lock.

② Remove the push plate by referring to the push plat replacement method (previous section).

③ Loosen side guide M3 fixing screw (4 places).

④ Remove the side guide while pushing the push supporter to the notes separation unit as much as possible. Then, replace with the side guide that fits into the notes type.

⑤ Assemble the unit in the order of ④~①.

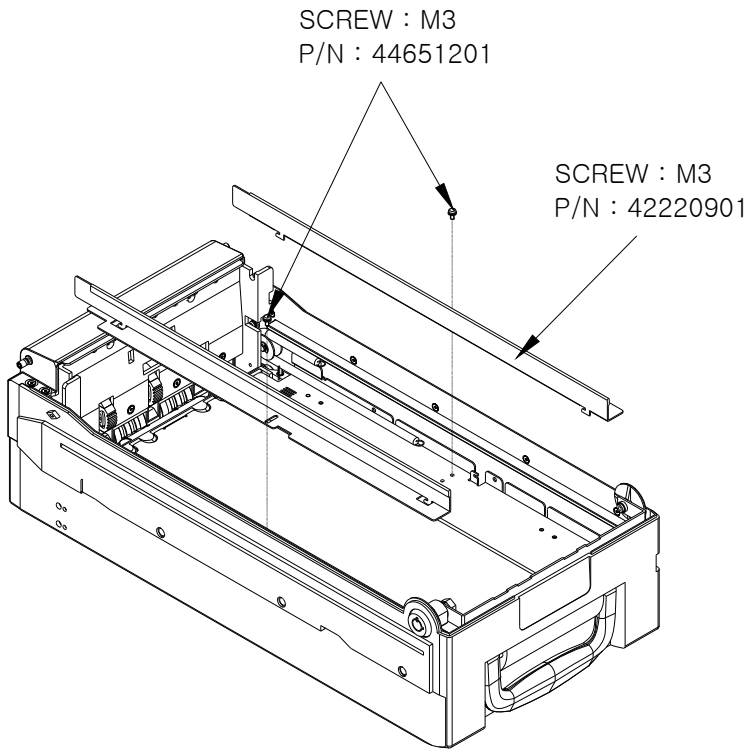



Fig. 7.50

⑥ Adjust space between the upper guide and the notes using the spacer, as shown in the figure below, so that it matches with the note type. At this time, use the proper number of screws according to that of the spacers.

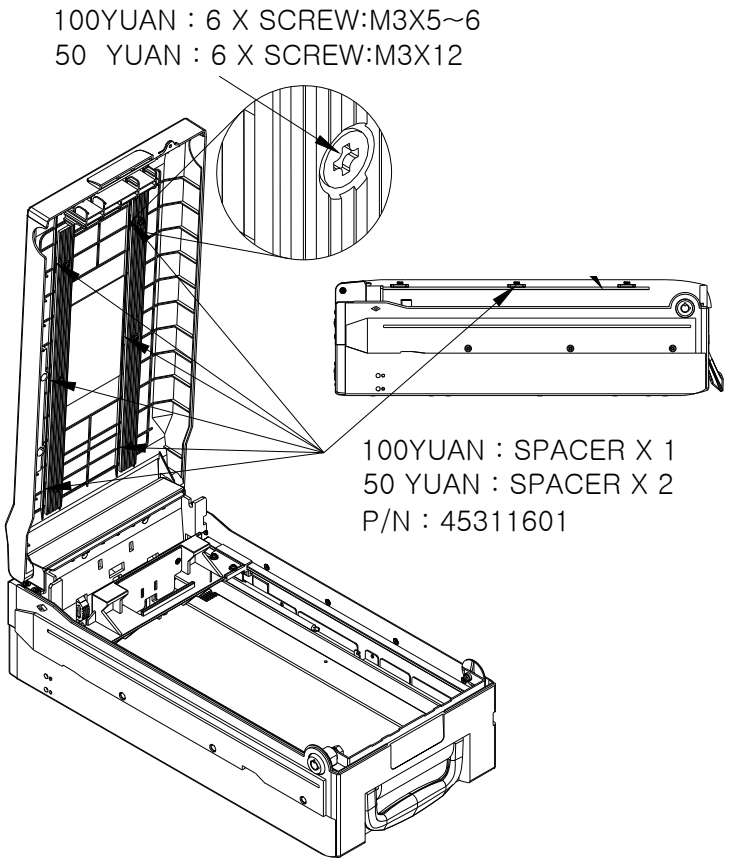

100YUAN : 6 X SCREW:M3X5~6
50 YUAN : 6 X SCREW:M3X12
100YUAN : SPACER X 1
50 YUAN : SPACER X 2
P/N : 45311601

Fig. 7.51

# Chapter 8. Receipt Printer

## 8.1 Overview

The Receipt Printer is located on the right side when opening the rear panel, and can be divided into 3 assemblies.

Body Assembly
TPH (Thermal Printing Head) Assembly
Outlet Assembly

The Body Assembly contains the hopper for the paper roller and the controller board. Next to the hopper is a sensor that detects the paper low status and issues a warning. This Body Assembly has a mechanism that reduces the stress coming from the paper roll and maintains paper tension. Also, if an attendant inserts the paper into machine, it automatically sets the paper and performs an advance paper and cut.

TPH (Thermal Printing Head) Assembly is a printing engine equipped with a thermal printing head and a cutter. It prints out what has been commanded by the Host, cuts the printed output and sends it to the Outlet Assembly.

Outlet Assembly has a long transport section which enables landscape printing. It is also easy to maintain or repair in case of receipt jams because of its open structure.

### 8.1.1 Appearance and Dimension

Dimensions of receipt printer are as follows:

145.8mm(W) X372.8m(D) X267.3mm(H) (316.5mm for Ø210 Roll)

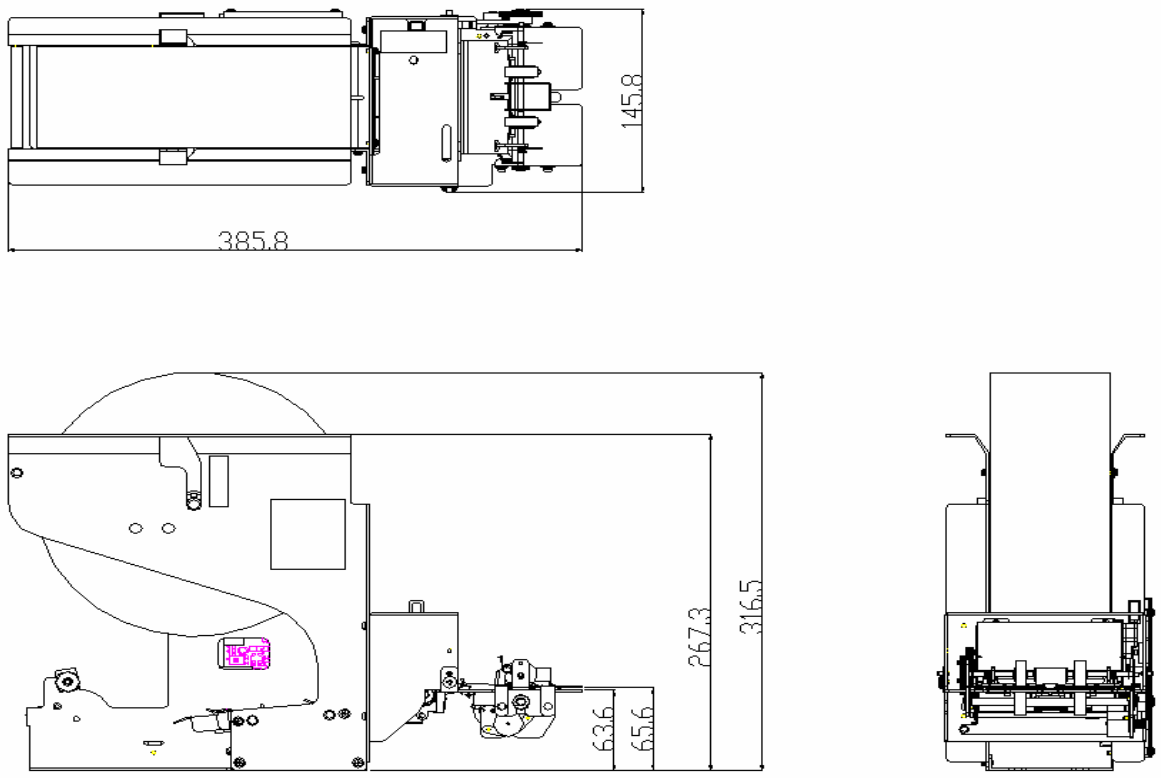



Fig. 8.1 Appearance of receipt printer

### 8.1.2 Basic Specifications

Basic specifications of the Receipt Printer are summarized as follows.

| Item | | Specifications | Note |
|---|---|---|---|
| Printing Type | | THERMAL LINE Printing Type(8dots/mm) | |
| Printing Speed | | 100mm/s | |
| Maximum Print Length | | 36~40 letters/line (based on Alpha Numeric value, Font 12x24) | |
| No. of Print Lines | | Max. 23lines/print (based on 1print=112mm ) | |
| Valid Printing Width | | Max. 72mm | |
| Type of Printer Letter | | Image Print Type | |
| Paper | Type | External Printing Thermal Paper | |
| | Width | 80 +0.0 -0.5mm | |
| | Exterior | Max. φ210mm | |
| Type of Paper Setting | | Semi-Auto loading | |
| Type of Receipt Cutting | | Full/Partial Cut | |
| END Detection Function | | Yes | |
| No. of Transaction | | Approximately 5100 ± 450 transactions/Roll (Φ210) | Based on 1transaction=112mm standard (thin type : 55gsm) |
| Communication Type | | USB 2.0 | |

**Note)** Thickness of paper is available up to 100㎛ and life of cutter is 300,000 times.

### 8.1.3 Specifications of DIP S/W setting

Control MEMORY scope by DIP S/W. (In case of SWITCH OFF, DIP S/W logic is 1.)

| No. | DIP S/W No. | | Description |
|---|---|---|---|
| | SW 1 | SW 0 | |
| 1 | 0 | | 9600BPS |
| 2 | 1 | | 115200BPS |
| 3 | | 0 | BLACK MARK is unavailable. |
| 4 | | 1 | BLACK MARK is available. |

### 8.1.4 Functional Description

There are 3 major functions of the Receipt Printer as follows.

1) Checking the status of the machine and setting paper.
2) Printing & Cutting
- Print Start (Thermal Printing Head Fire)
- Black Mark Start and Stop
- Cutting
3) Ejecting
- Releasing the cut paper respectively

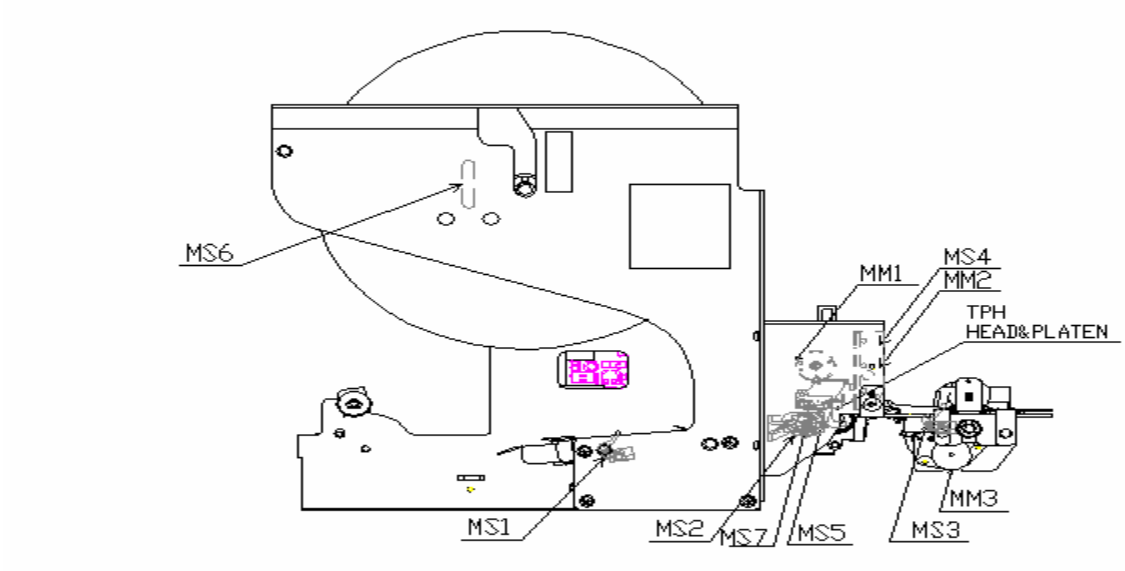



Fig. 8.2 Layout of sensor and actuator

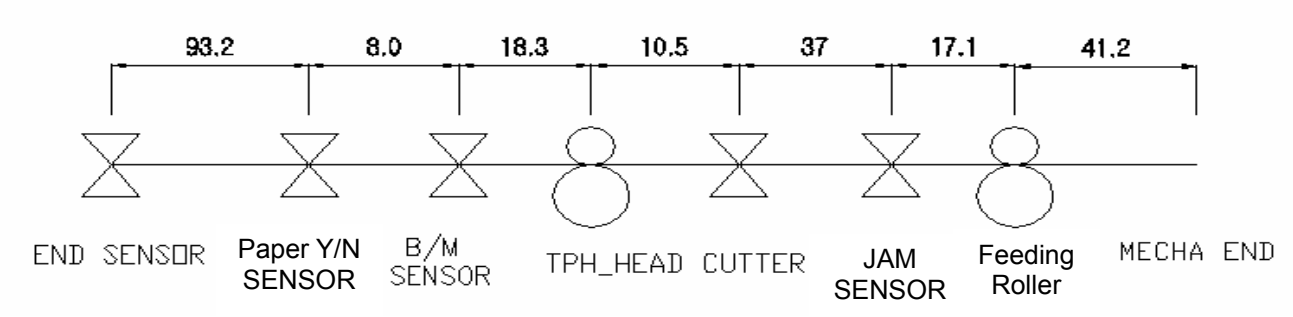



Fig. 8.3 Distance between sensor and actuator roller (Approximately)

The symbols, names, and major functions of each sensor and electromagnetic component are summarized in the following table.

| NO | SYMBOL | NAME | MAJOR FUNCTIONS | DEFAULT VALUE |
|---|---|---|---|---|
| 1 | MS1 | END DETECTION SENSOR | END DETECTION | DEFAULT:OFF |
| 2 | MS2 | AUTOLOAD SENSOR | PAPER AUTOLOAD/<br>PAPER EMPTY CHECK | DEFAULT:OFF |
| 3 | MS3 | JAM SENSOR | PAPER JAM SENSOR | DEFAULT:OFF |
| 4 | MS4 | CUTTER SENSOR | CUTTER LOCATION DETECTION | DEFAULT:ON |
| 5 | MS5 | TPH PLATEN SWITCH | TPH PLATEN OPEN SWITCH | DEFAULT:ON |
| 6 | MS6 | SENSOR FOR DETECTING REMAINED PAPER (OPTION) | DETECTING REMAINED PAPER | DEFAULT:OFF - |
| 7 | MS7 | BLACK MARK SENSOR | BLACK MARK DETECTION | DEFAULT:OFF |
| 8 | MM1 | FEEDING MOTOR | PAPER FEED | |
| 9 | MM2 | CUTTER MOTOR | CUTTER OPERATION | |
| 10 | MM3 | FEEDING MOTOR | PAPER FEED | |

The major detection functions of the above sensors and electromagnetic components include paper empty check by section, checking the status of “cutting” using the cutter position switch, OPEN/CLOSE detection of the TPH cover, and detection of the TPH overheating and paper jams.

## 8.2 Troubleshooting

### 8.2.1 Troubleshooting Tools

Following is the procedures for handling problems related to the Receipt Printer that includes receiving complaints, dispatching a technician to the branch, verifying the problem, inspecting the machine, and taking proper actions.

**Trouble Verification**

- Communication LED on the Controller Board
- Power LED on the Controller Board
- Error Code on the Supervisor screen
- Software Trace file
- Paper Jams in the Transport path and existence of foreign substances

Go to the Supervisor Mode and see if there is an error code displayed at the bottom of the screen. If there is an error code, identify the type of error by checking the error code table in the manual. If no error code is present, enter the Technician Mode to initialize the system or conduct a functional test to see if the problem occurs.

### 8.2.2 Scope of Repair at the Field Level (Recommendations)

The scope of repair that can be supported at the field level is limited only to fixing the communication or power cable problems, resolving jams, checking motor, sensor or controller board problems. Adjustments, lubrication and cleaning are also supported in the field. For problems with other components, replace the Module and inspect and repair it at the Depot level.
This is just a recommendation and can be adjusted depending on the field conditions or capability of the technician involved.

| No | Field repair items | Tool | Remark |
|---|---|---|---|
| 1 | Communication Cable | Slotted screw driver, Meter | |
| 2 | Power Cable | | |
| 3 | Receipt Jam | | |
| 4 | Motor | Slotted screw driver, Meter | |
| 5 | Sensor | | |
| 6 | Controller Board | Screw driver, Meter | |
| 7 | Mechanical Adjustment | | |
| 8 | Lubrication | | |
| 9 | Cleaning | Air blower, Q-tip, Swab | |

Since items not included above cannot be checked or repaired in the field, replace the entire Module and check and repair it at the Depot level.

### 8.2.3 Troubleshooting Procedure

1) When arriving at the branch which has reported the complaint, identify the problem focusing on the module where the problem has been reported. For further details, refer to “Error code and Troubleshooting” chapter. If the problem lies in the Receipt Printer, move to the next step.

2) Enter the Supervisor Mode and check the Status LED on the initial screen. Verify if the error field contains a red light and if there is any error code displayed at the bottom of the screen. If there is an error code appearing on the screen, identify the type of error by checking the error code table in the manual.
3) If no error code is present, enter the Technician Mode to initialize the Receipt Printer or conduct a

functional test to see if the same problem occurs.

4) Using the error code information in the manual, identify the items with potential problems and determine whether the repair can be supported in the Field. Error codes for the Receipt Printer are defined in “Error code and Troubleshooting” chapter.

5) If the problem falls into the category of field repair items, take immediate actions following the procedures described in Chapter 8.2.3.1~9. If not, replace the entire Receipt Printer.

6) When replacing the Receipt Printer, obtain and store the Journal and Log files.

#### 8.2.3.1 Communication Problem

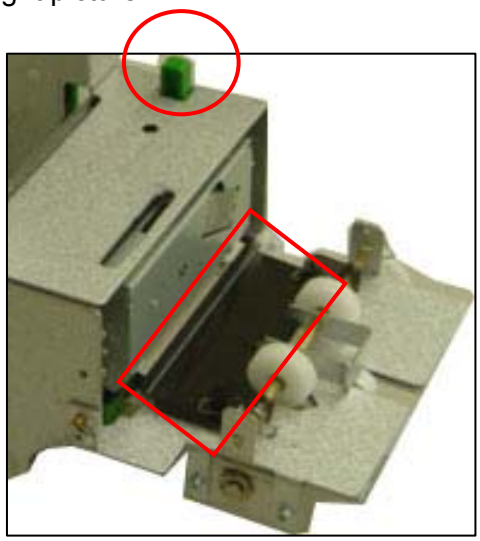
1) Check if the 2 LEDs(TxD, RxD) are blinking on the Controller Board of the receipt printer.
2) See if the USB Communication cable is properly plugged in at the CE engine and the controller. Reseat the cable connections on both ends. Check the cable for damage or worn places.
3) Go to the supervisor mode and enter the Start>Control Panel>Device Property, and see if the receipt printer inside the USB3-USB 1Hub is properly set up.
4) Replace the Controller Board.
5) Replace the CE engine.

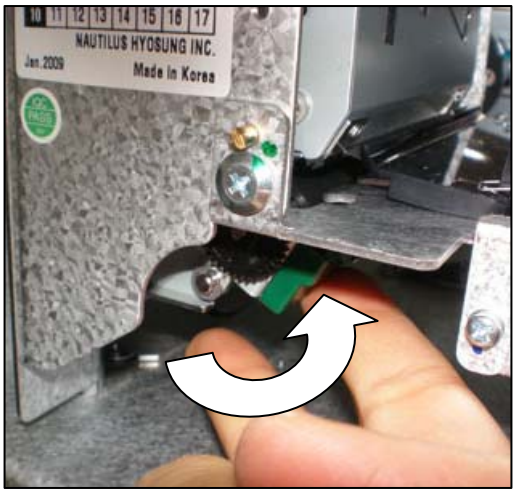
#### 8.2.3.2 Power Problem

1) Check if the LED (PWR) is illuminated on the Controller Board.
2) Measure the voltage at Controller Board using a volt meter and verify if the Board has normal voltage input.
3) Change the Controller Board.
4) Look at the LED status of the Power Supply and replace it if there is a problem.

### 8.2.3.3 Clearing Paper Jam

1) First insert the key into the upper door on the rear of ATM and turn it clockwise.
2) Then pull out the panel outward.
3) First, check if there is a jammed paper around transparent guide.
   If so, after pressing the green lever, lift up the transparent guide and cut out the jammed paper with mechanical cutter carefully as shown left picture.
4) After removing paper jam, be sure to close the receipt printer bracket by pushing it up as shown right picture.






### 8.2.3.4 Controller Board

If the following conditions occur, replace the Controller Board.

1) When turning on the ATM power, the RxD LED on the Controller board flashes a few times but TxD LED doesn't flash at all.
2) When pressing the Self Test switch on the Controller Board, the Controller Board does not work or strange letters comes out on the print out.
3) If you are having problems with communication, voltage, electromagnetic component Motor, Solenoid, Micro-clutch or sensors. If the power to the Controller Board is normal but the Power LED is not illuminated.

### 8.2.4 Common Occurred Problems

1) Paper jams including no cutting paper
2) Incorrect paper loading
3) Print quality is bad

## 8.3 Mechanical Adjustment

When disassembling or assembling any components or assemblies in the field, it is essential to follow the proper adjustment specifications recommended by Hyosung. Performing the correct adjustment can have a critical impact on the lifespan of the component. If the adjustment is incorrect, the problem may not appear during the initial testing, but the lifespan of the component can be shortened considerably. In addition, incorrect adjustment can cause such problems such as receipt jams.

### 8.3.1 Adjustment of the Guide Inlet

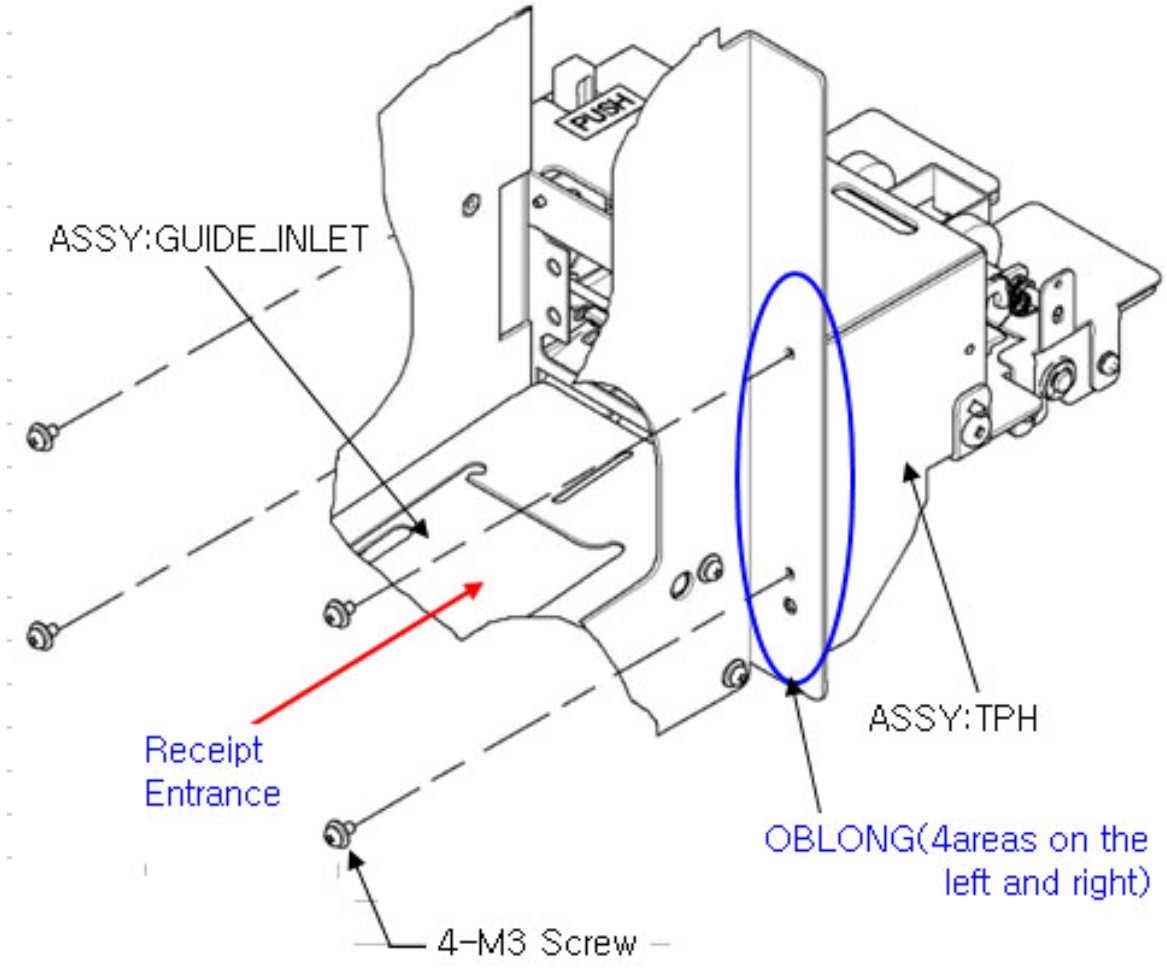



Fig. 8.4 Guide Inlet Adjustment

| Item No. | 1 | Adjustment Item | Assy:Guide Inlet |
|---|---|---|---|
| Adjustment Method | | | |
| - Adjust the Entrance of the ASSY:GUIDE INLET and the ASSY:TPH<br>1. Half tighten the four M3 Screws, and input a receipt in the direction of the arrow.<br>2. If ASSY:TPH(7320000120) is tilted to one side, the receipt cannot be input. In such a case, use the OBLONG of the FRAME for the left/right adjustment of the ASSY:TPH(7320000120) and tighten the screws completely. | | | |

## 8.4 Preventive Maintenance

### 8.4.1 Cleaning

In order to prevent problems caused by the dirt or debris of the electromagnetic components on the transport path, it is important to strictly follow the cleaning cycles and methods described in this section.

#### 8.4.1.1 Description of Receipt Printer Sensors and Locations

**1) Sensor**

Using a cotton swab or a Q-tip, eliminate foreign substances like dirt or waste. After cleaning, check the sensor by conducting a Self Test, and check at least 3 times the cleaning status, angle of the sensor, and the accuracy status of the assembly. If it is defective, replace the sensor with a new one.

| Labeled Sensor | Functionality |
|---|---|
| MS1 | END DETECTION SENSOR |
| MS2 | AUTOLOAD SENSOR |
| MS3 | JAM SENSOR |
| MS4 | CUTTER SENSOR |
| MS5 | TPH PLATEN SWITCH |
| MS6 | SENSOR FOR DETECTING REMAINED PAPER (OPTION) |
| MS7 | BLACK MARK SENSOR |

**2) Transport path**

Turn off power, and reciprocate the cleaning brush a number of times to clean the components (Roller, Cutter, etc.) on the Transport Path. Prevent static electricity occurring on the TPH print head by being careful not to touch it with your hands.

**3) TPH & Platen**

Turn power off and open the Platen Open Lever (Green). Wipe the Heat Element and the Platen with cotton soaked in ethanol, methanol, or IPA. After the cleaning substance has evaporated, place the Platen at the normal operating position.

**4) Other Cautions**

When transporting the Receipt Printer assembly, hold it with two hands under the printer. Do not

hold the print release section of the assembly. For repairing the Receipt Printer, do not forget to place it on the flat surface. There must be no shaking or interventions from other objects.

#### 8.4.1.2 PM (Preventative Maintenance) During Repair Calls

1) Perform the following steps, after you have made repairs or cleared paper jams.

2) Remove all accumulations of dust and paper residue from the unit using a brush and cleaning rag. Any debris left may be blown away using canned air. Make sure that you clean the surfaces of every sensor on the SPR by using foam or cotton tips. Any cracked or broken sensors must be replaced.

3) Open the Print head assembly and using canned air, blowout any dust or debris inside this area.

4) Ensure that all transport belts are in the correct pulley position. If belts continuously get out of place, this is a good indication of wear and the module needs to be replaced.

5) Ensure printing records are printed clear and legible.

6) After you have repaired and performed your PM, it is imperative that you run diagnostics to fully test the unit.

7) Fill out the ATM Repair Log Sheet

#### 8.4.1.3 PM Every 3 Months or 20,000 Transactions

1) Perform steps 1 – 7 of the SPR Preventative Maintenance during repair calls.

### 8.4.2 Lubrication

- Check the oiling status before running or storing the receipt printer. If needed, apply lubricant to the corresponding part in compliance with the oiling standard.
- Apply grease only if necessary during the regular field inspection. If there is enough lubricant, do not apply additional lubricant. However, if lubricant is contaminated, remove the old lubricant before applying new.
- All pivot points and frictions parts must be oiled.
- All points except the following must be oiled:
  Printing head, Magnetic head, Package, Micro switch contact, Drive roller, Timing pulley, and Timing belt
- All oiling operations must be based on oil drop unit. However, when contact between the oiling device and the oiling target is unavoidable, the contact time must not exceed one second.

**[NOTE!]**

- Lubricant must not leak. In other words, lubricant must be applied only to the parts that need oiling. Do not apply excessive lubricant. Lubricant must not contaminate other parts. Be careful that the micro switch, sensors, the timing pulley, the timing belt, the controller board, the print head, and the magnetic head are protected from lubricant.
- Do not clean plastic parts or protection devices with alcohol and other agents other than the designated one.
- Remove dust, oil, and grease from the assembly and clean with a dry soft cloth.
- Be careful that the paper contact areas in the paper return path is protected from lubricant.
- Lubricant Types

| Description | Represented with Letter |
|---|---|
| Shell Grease Alvania EP (Small container) | “B” |
| Shell Oil Tellus #100 | “C” |

## 8.4.3 Lubrication Point

### 8.4.3.1 SPR Preventative Maintenance Every 6 Months or 40,000 Transactions

1) Support engineering recommends that the SPR gets lubricated every 6 months. All lubrication points illustrated must be checked and lubricated if necessary. Before you apply any type of lubricant, it is imperative to wipe off any of the old lubricant left on the assembly. The SPR does not require much lubrication. There are only 2 types of lubricants designated to be used in this assembly and they should be applied on specific locations illustrated on the following images.

**[NOTE!]**
Greasing: When applying grease, it is CRUCIAL to clean and apply a very light amount on the designated areas, especially gears.

Oiling: It is imperative to clean the components first and then apply a very light amount of oil.

AREAS NOT SPECIFIED IN THIS DOCUMENT, DOES NOT REQUIRE LUBRICATION.

MAKE SURE Belts, Printhead, Micro Switches, Timing Gears and Drive Rollers IN THE SPR ARE “NOT” CONTAMINATED WITH ANY LUBRICANT. THIS MAY DAMAGE OR CHANGE THE FUNCTIONALTY OF THE COMPONENT.

### 1) GEAR

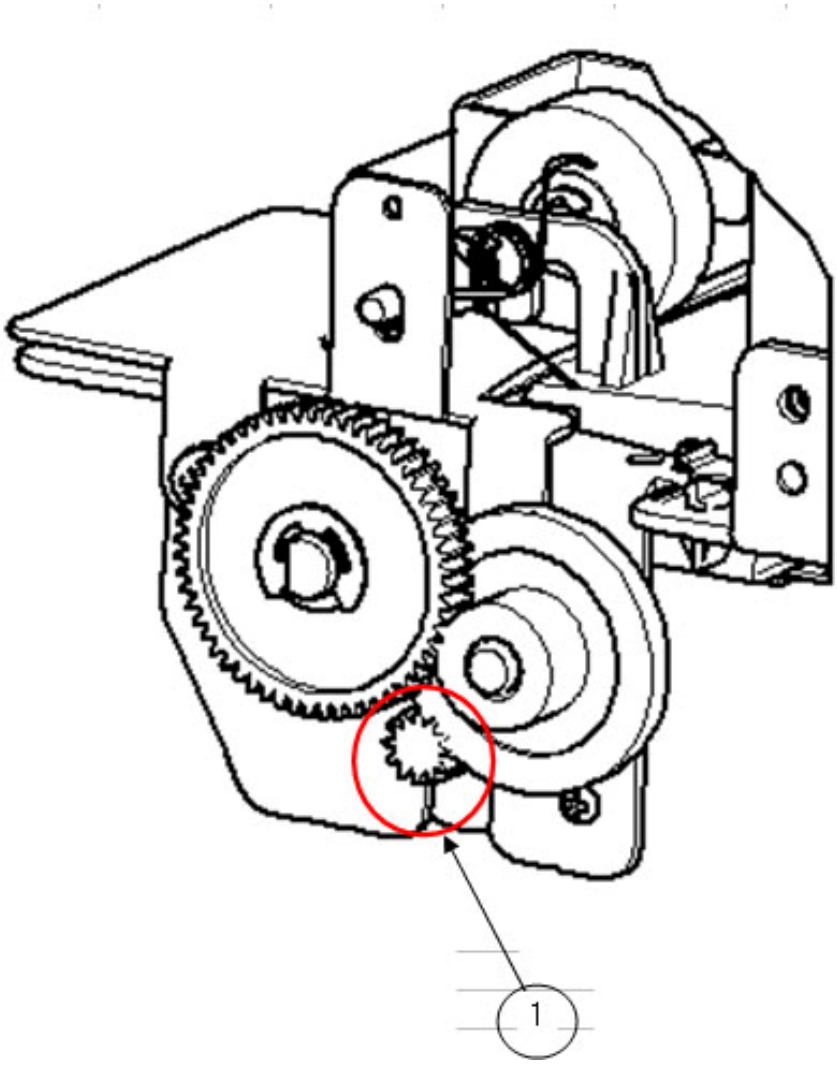



Fig. 8.5 Lubrication point 1

## 2) SPRING HOOK

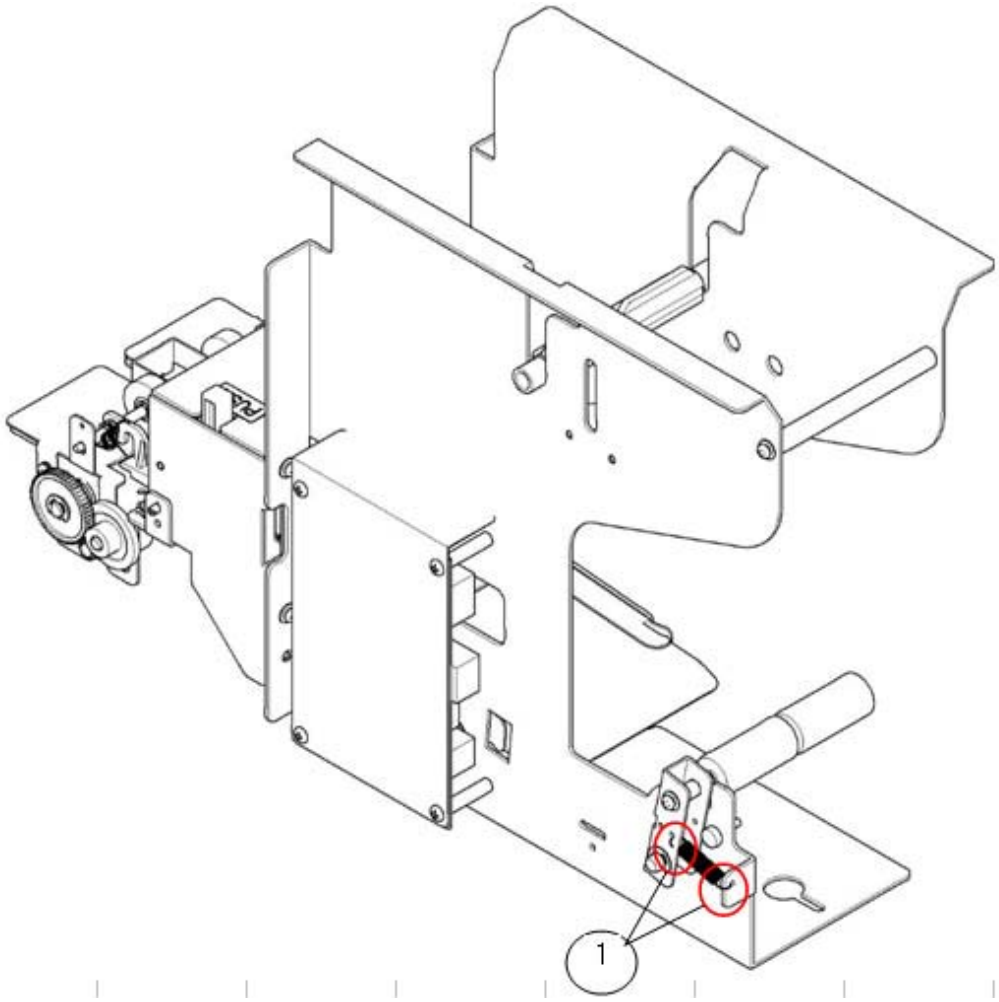



Fig. 8.6 Lubrication Point 2

## 8.5 Removal/Installation Procedure for Field Technician

There are several parts or assemblies that can be replaced in the field. In order to repair other components, the entire receipt printer should be replaced at the Depot level. Note however, that this is just a recommendation and can be adjusted depending on field conditions or the capability of the technician.

| SECTION | LOCATION DETAIL | REMARK |
|---|---|---|
| Entire Unit | Receipt Printer | Field technician Level |
| Sensor | MS1, MS3 | |
| Controller Board | | |
| Motor | | |
| Outlet guide | | |
| Other components not mentioned above | | Deport Level |

### 8.5.1 Entire Unit Replacement

1) Open the front door and turn off the system power.

2) Pull the rail assembly out with the Receipt Print assembly and remove the Receipt Roll.

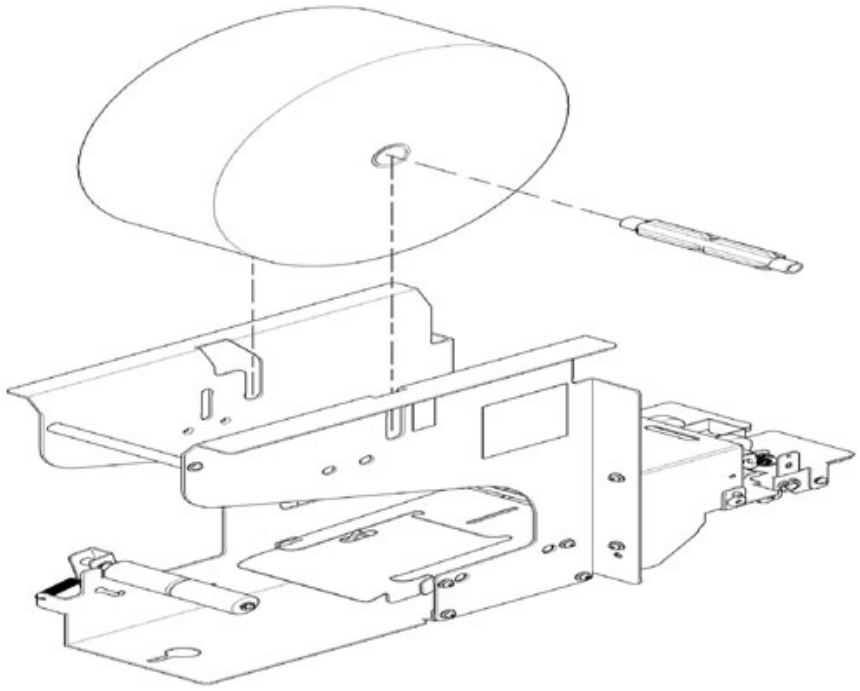


Fig. 8.7 Entire unit replacement procedure 1

3) Disconnect the USB and the Power Cable.

4) Loosen 1 screw at the back and pull the receipt printer as shown below to remove the entire Receipt Printer assembly.

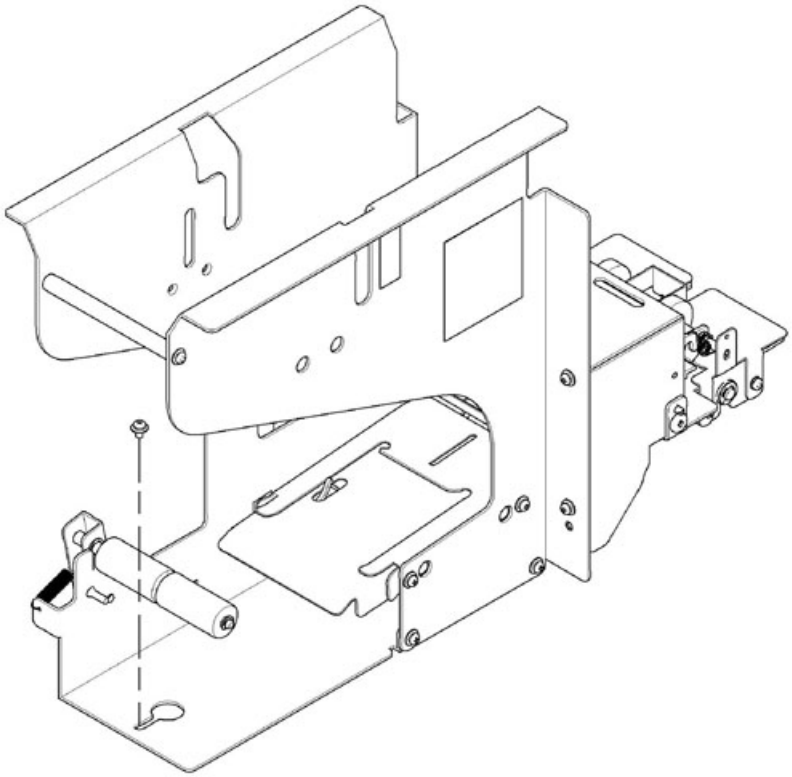


Fig. 8.8 Entire unit replacement procedure 2

### 8.5.2 How to easily take apart the Assembly

For repair of the assembly, it is easy to disassemble the printer into 3 assemblies as shown below,

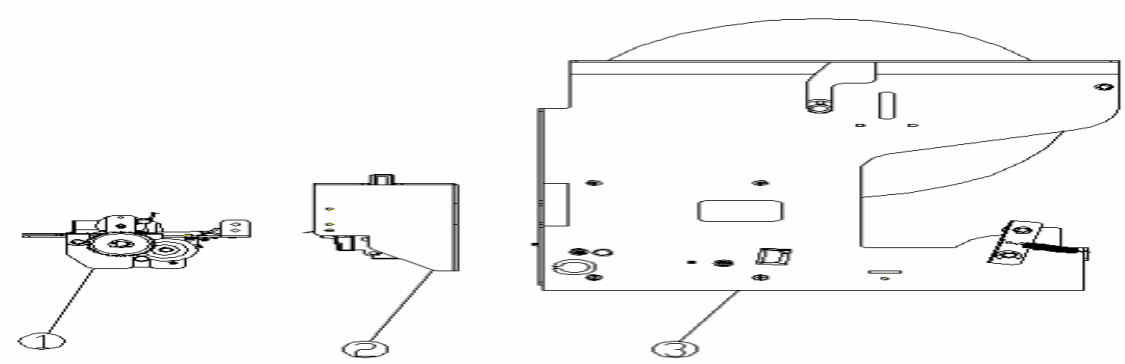



Fig.8.9 How to easily take apart the Assembly 1

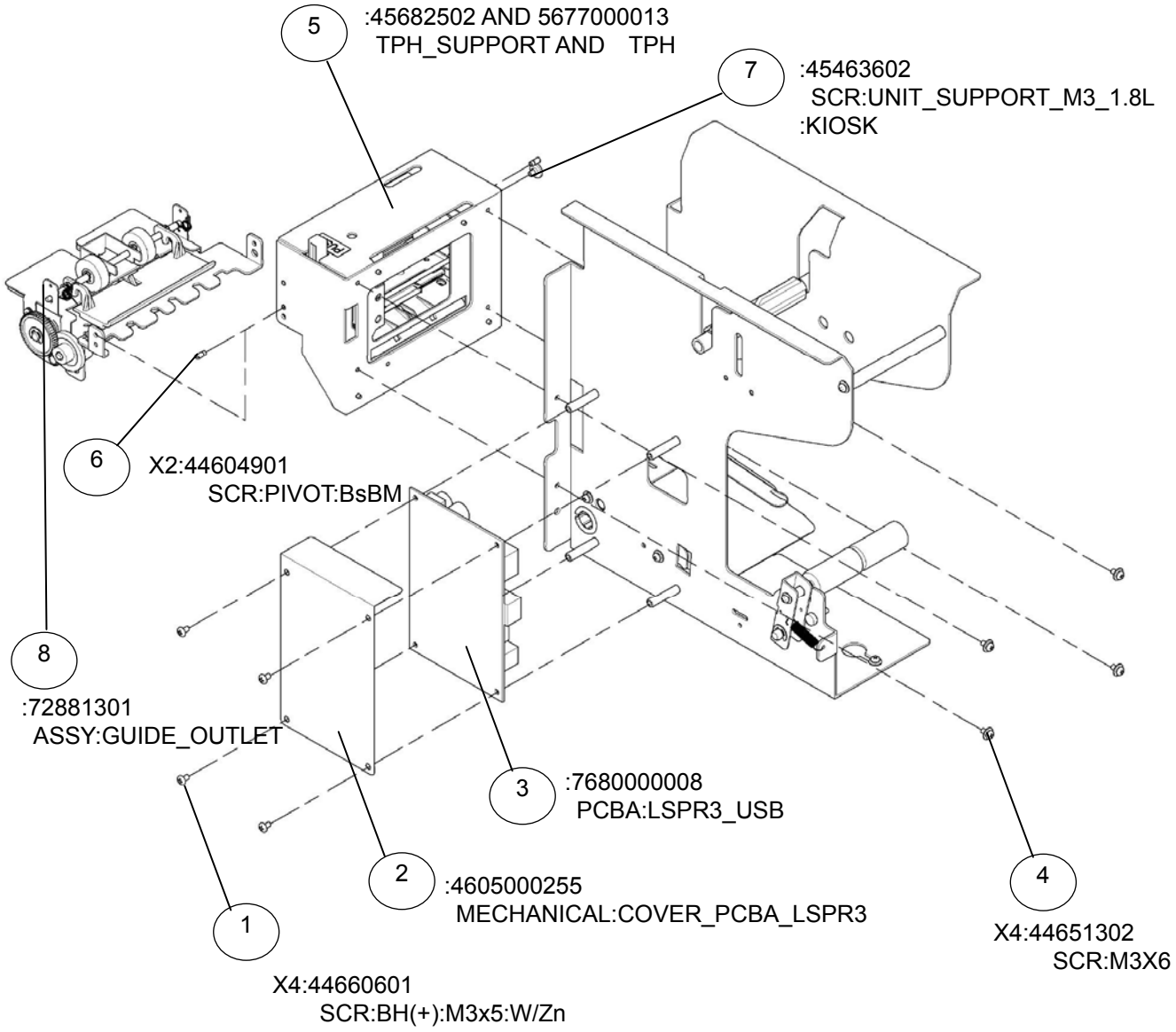



Fig. 8.10 How to easily take apart the Assembly 2

1) Remove cover and PCBA by unscrewing ① screw (44660601).
2) Disassemble connectors connected to PCBA.
3) Disassemble TPH_SUPPORT from the receipt printer by unscrewing ④ screw (44651302).
4) Separate TPH_SUPPORT and ASSY:GUIDE OUTLET by unscrewing ⑥ and ⑦ screws.

## 8.5.3 Sensor Replacement

### 1) MS1 Sensor

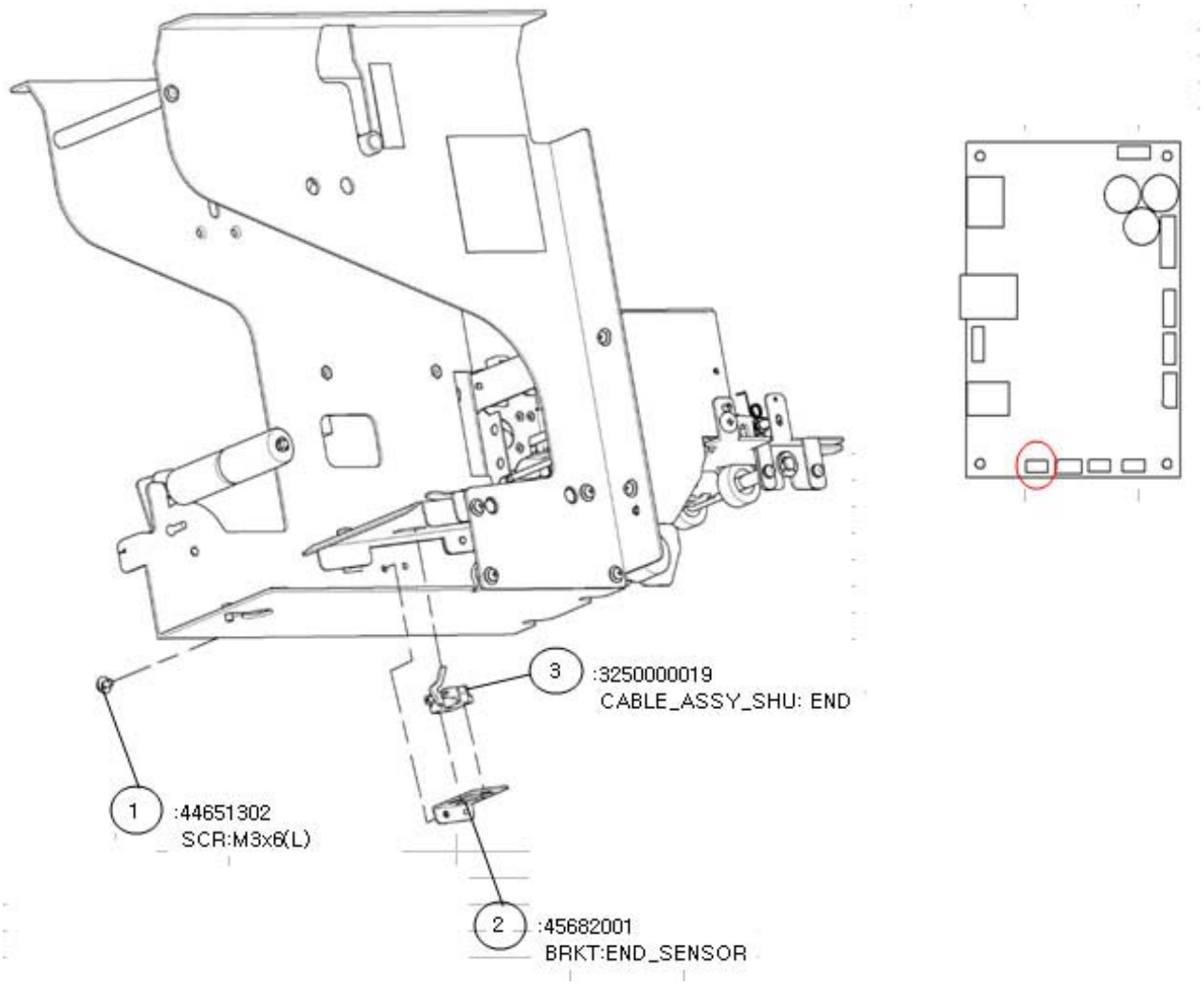



Fig. 8.11 Sensor Replacement 3

1) Disassemble PCBA and CONNECTOR.
2) After removing ① screw, disconnect BRKT(②) and CABLE ASSY(③).
3) Replace CABLE_ASSY as new one.

**2) MS3 Sensor**

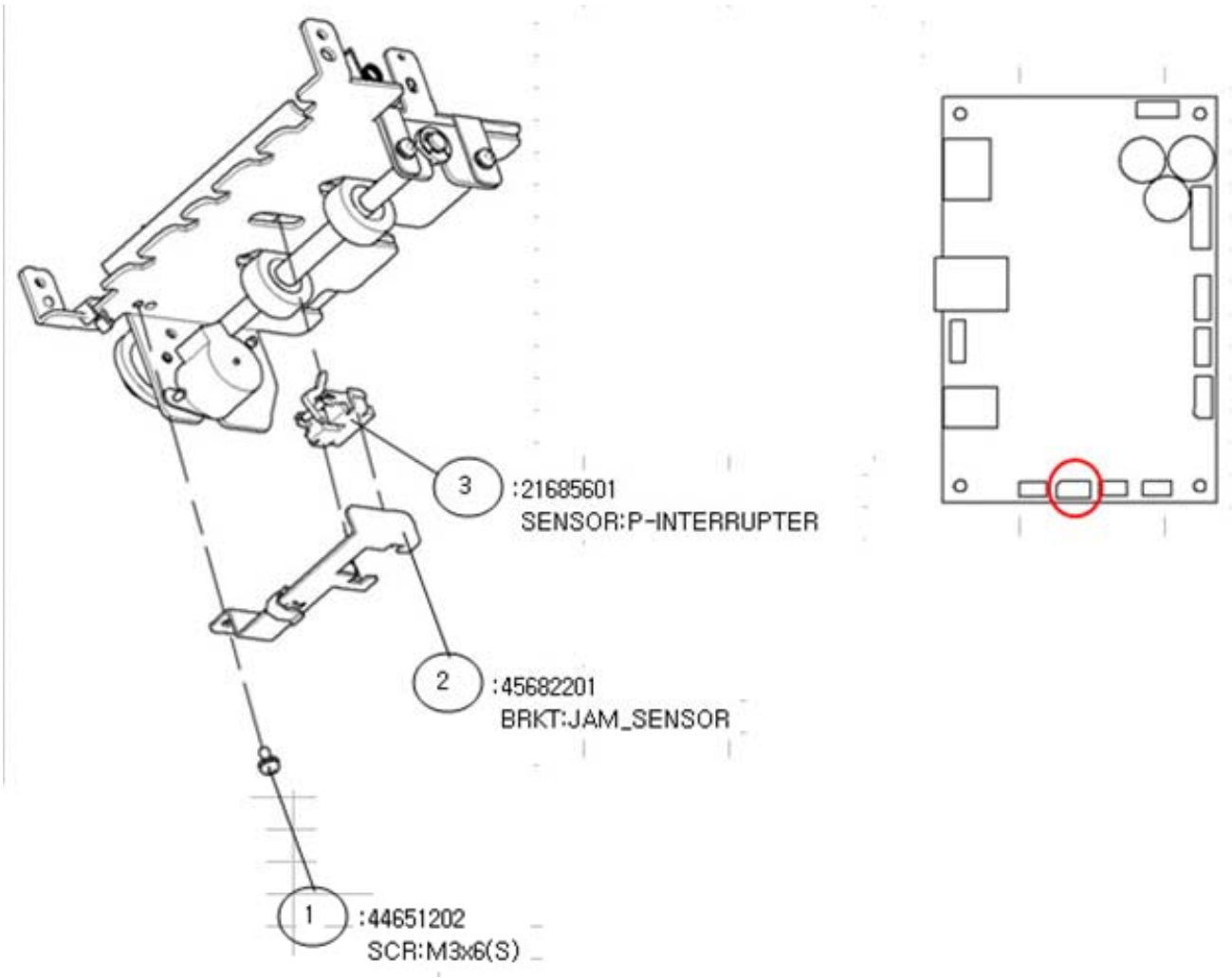



Fig. 8.12 Sensor Replacement 4

1) Disconnect cable connector from PCBA.
2) Remove ① screw.
3) Disconnect BRKT:JAM_SENSOR and SENSOR:P-INTERRUPTER.
4) Replace sensor as new one.

### 8.5.4 Sub-assembly Replacement

#### 1) Thermal Printing Head

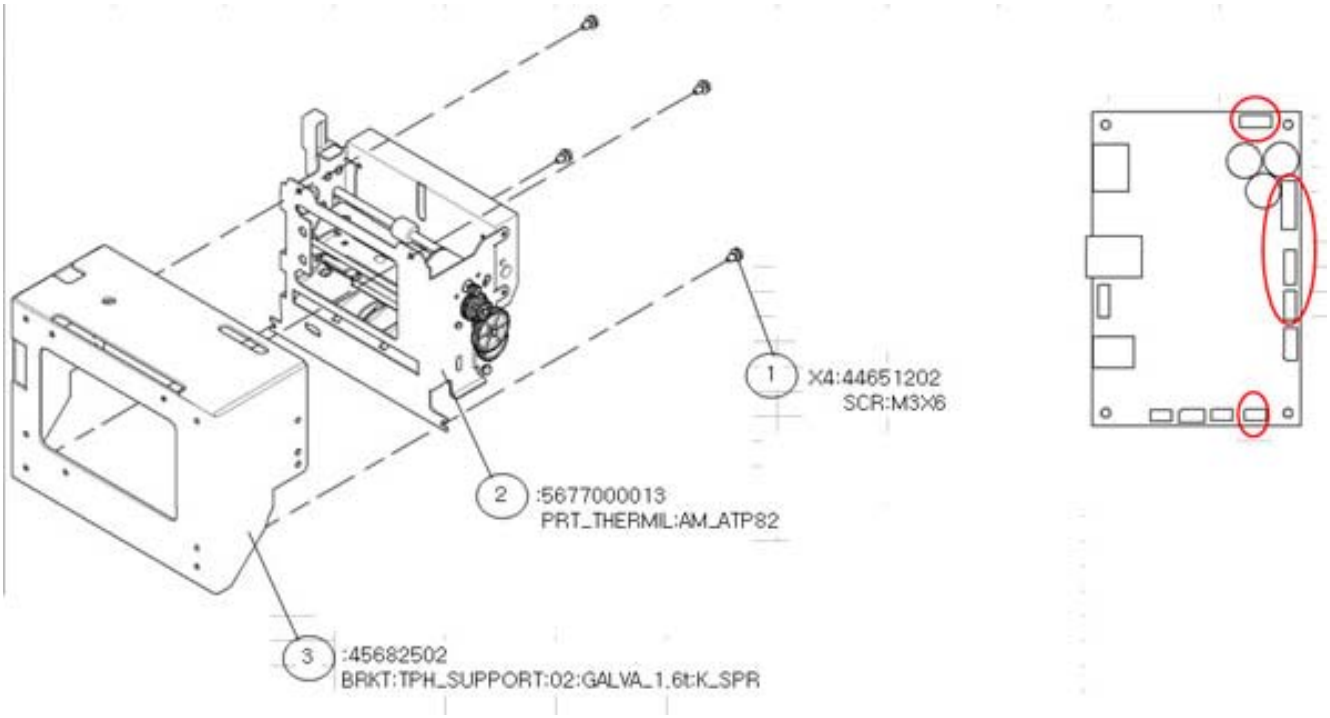



Fig. 8.13 Sub-assembly Replacement 1

When taking out the Print Head, be careful not to damage the FFC Cable. Make note of the cable orientation on the PCB before disconnecting. Match the Pin configuration when re-assembling the FFC Cable to the Control Board.

[Note ]
Insert HEAD OPEN LEVER into the interference evacuation zone when assembling TPH and TPH_SUPPORT.

[WARNING!]
Since the FFC Cable has different voltages (+3.3V, +5V,+12V,+24V) connected together, it is very important to match the correct Pin configuration when re-assembling a cable to the connector. Damage to the control board can occur if the cables are not connected properly.

### 2) Outlet Guide Replacement

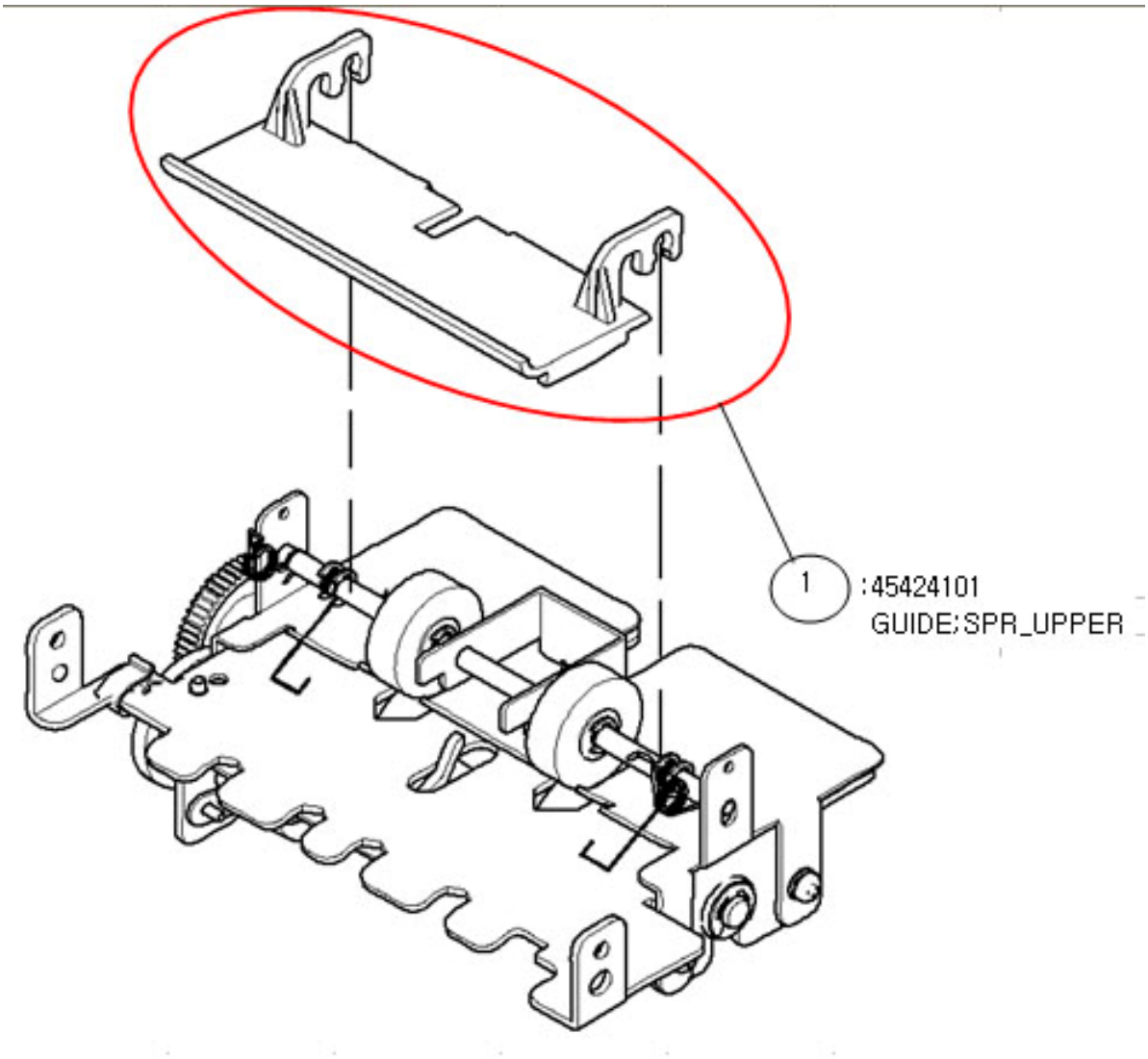



Fig. 8.14 Sub-assembly Replacement 2

1) Pull up the spring, take out the Guides and replace them (Refer to VIEW "A").

### 3) MOTOR Replacement

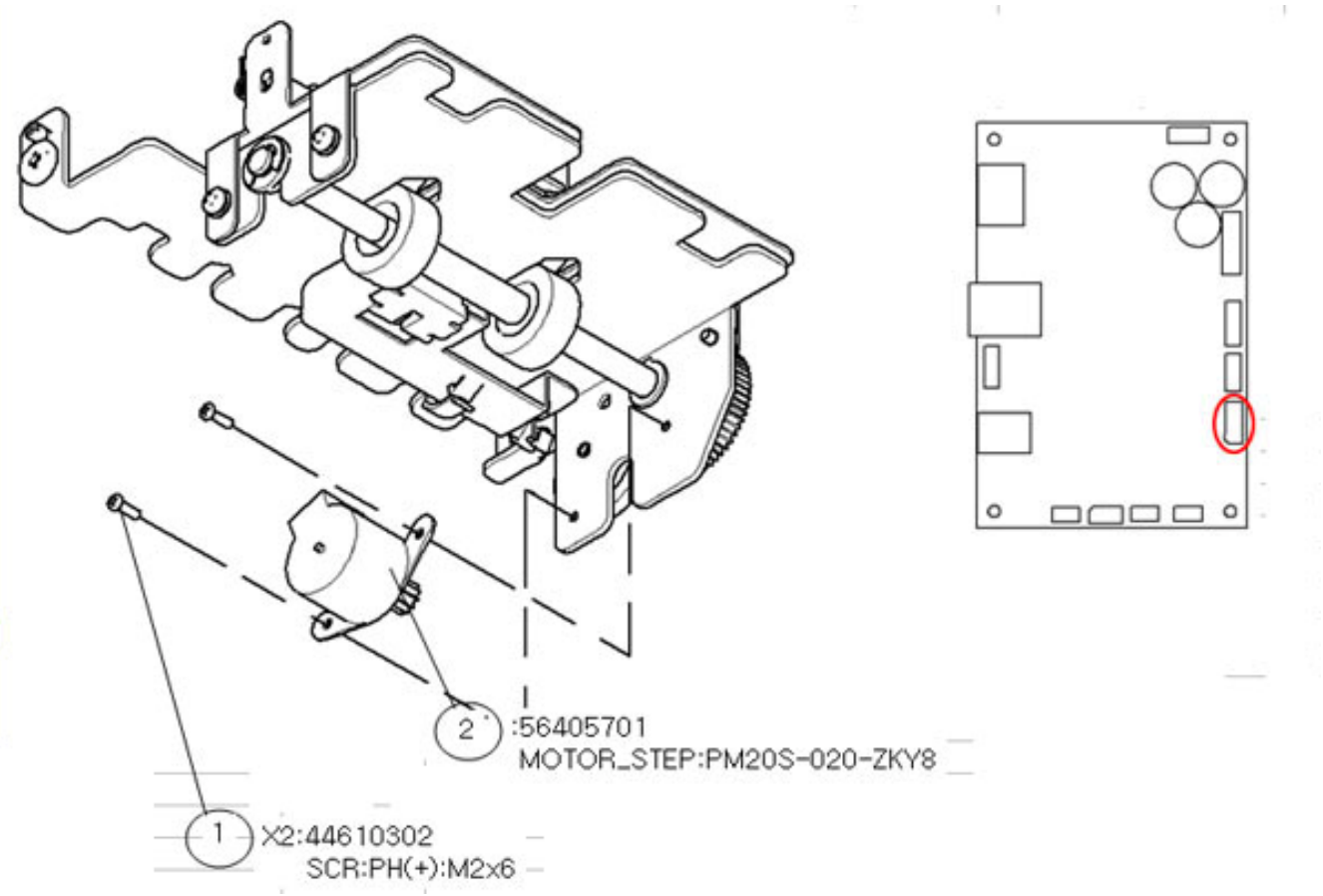



Fig. 8.15 Sub-assembly Replacement 3

1) Separate motor connector from PCBA.
2) Unscrew ① screw (44610302) and disassemble motor (56405701).
3) Replace motor as new one.

### 4) Control Board

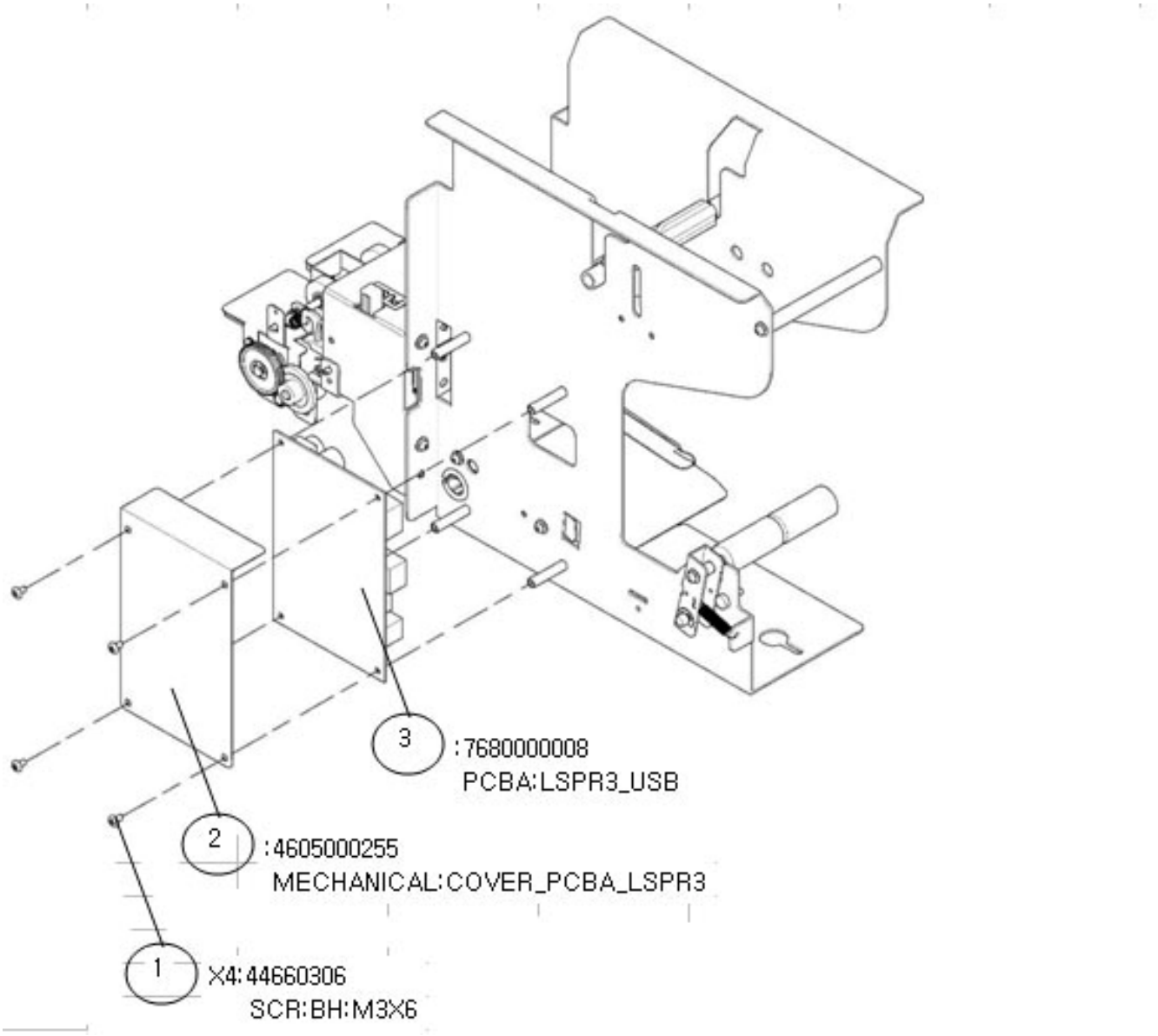
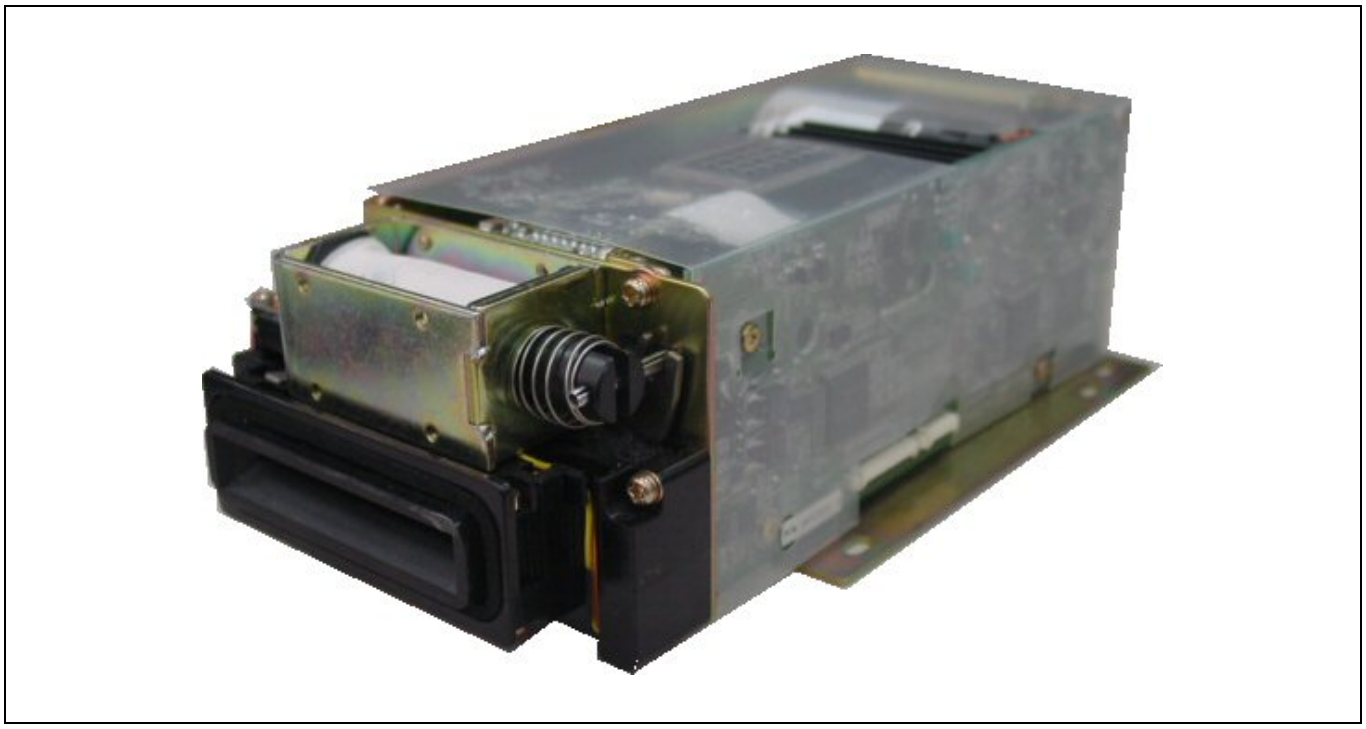



Fig. 8.16 Sub-assembly Replacement 4

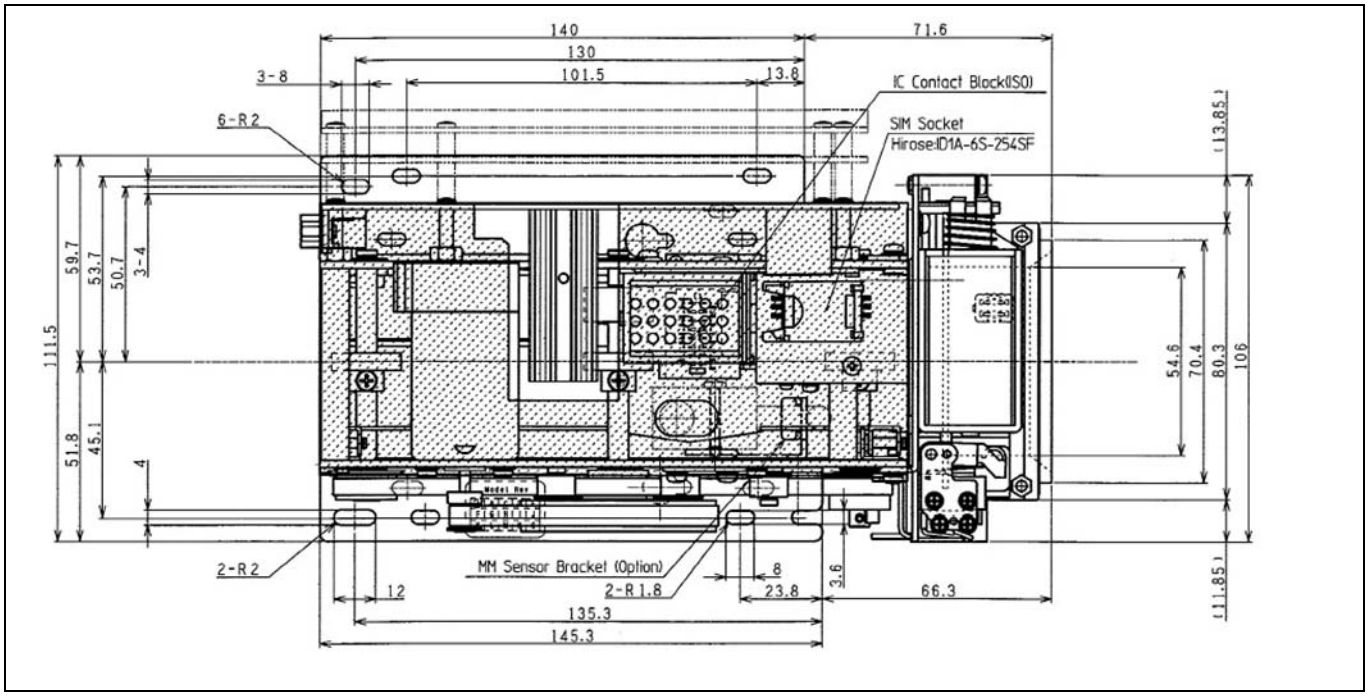
1) After removing ① screw and cover, disassemble PCBA from receipt printer.
2) Separate all connectors connected to PCBA.
3) Replace PCBA as new one.

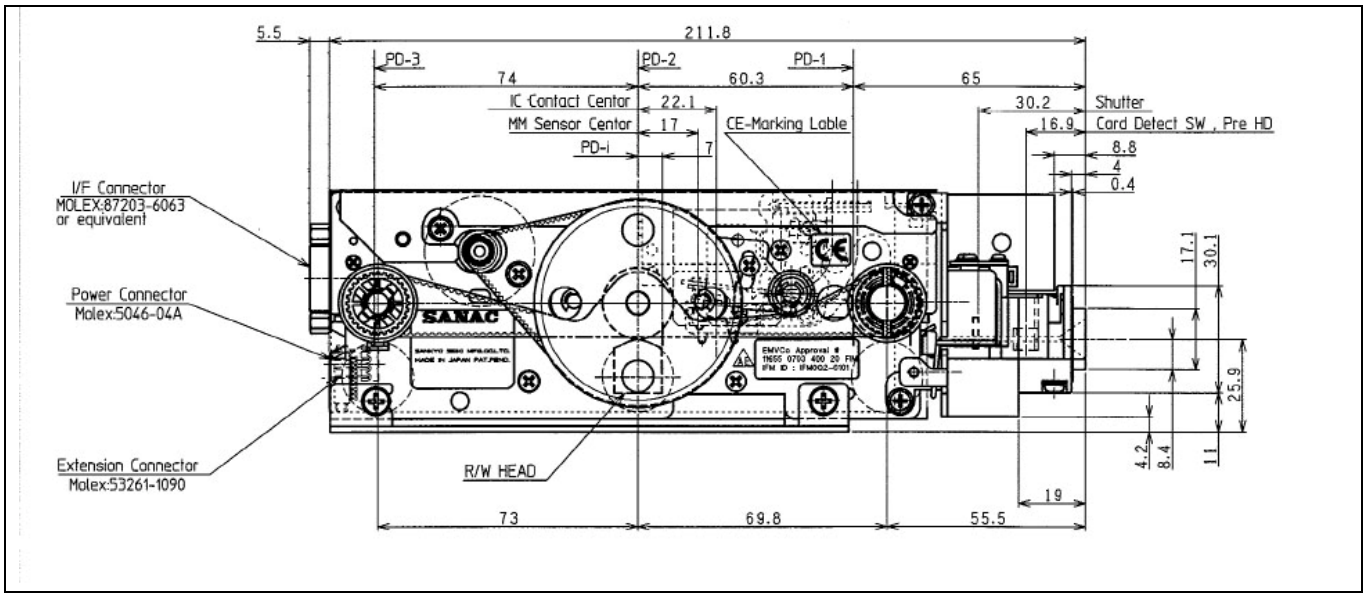
# Chapter 9. Magnetic Card Unit

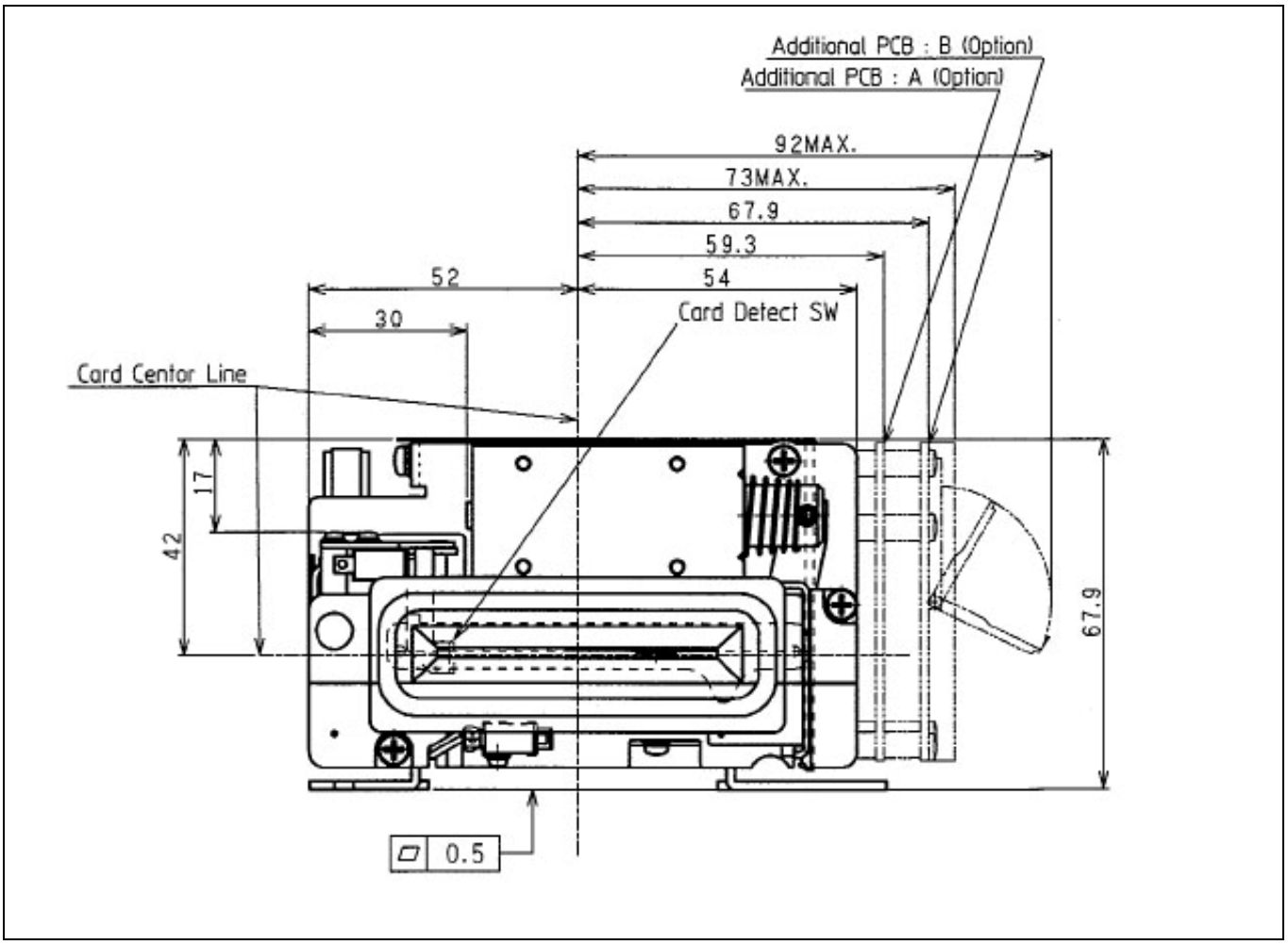
# 9.1 Magnetic Card Unit : Motor Driven Type

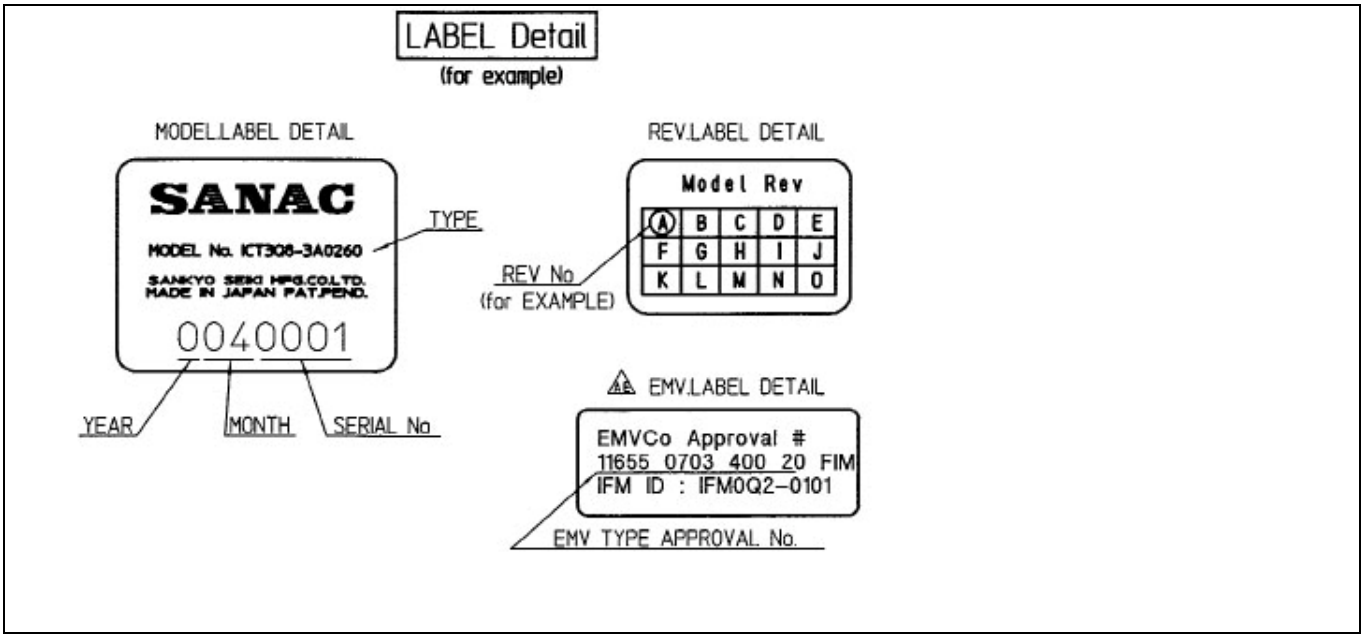


### 9.1.1 Outside drawing and dimension




Additional PCB : B (Option)
Additional PCB : A (Option)
92MAX.
73MAX.
67.9
59.3
52
54
30
Card Detect SW
Card Center Line
17
42
67.9
0.5


LABEL Detail
(for example)
MODEL.LABEL DETAIL
SANAC
MODEL No. ICT3Q8-3A0260
SANKYO SEIKO MFG.CO.LTD.
MADE IN JAPAN PAT.PEND.
0040001
TYPE
YEAR
MONTH
SERIAL No
REV.LABEL DETAIL
Model Rev
A B C D E
F G H I J
K L M N O
REV No
(for EXAMPLE)
EMV.LABEL DETAIL
EMVCo Approval #
11655 0703 400 20 FIM
IFM ID : IFM0Q2-0101
EMV TYPE APPROVAL No.

### 9.1.2 Basic specification

**Card feed**

Round trip and capture

**Card feed speed**

At mag-stripe Read/Write 190 mm/s±3%

At card transport only 380 mm/s (typ.)

**Card feed time**

Approx. 1.5 s (Round trip)

**Card eject length**

More than 20mm

**Dielectric strength**

DC200 V, 1 min (Measured between PCB ground & frame)

**Insulation resistance**

More than 10 MΩ at DC 200 V (Measured between PCB ground & frame)

**Mag-stripe Read/Write**

ISO/IEC Track 1,2,3 : Read/Write

**Interface**

RS232C/D compatible

Interface connector : CD5509PA1F0(Cvilux) or equivalent

**Compatibility**

The transport has compatibility with ISO-IEC standard cards.

Conform to ISO/IEC7811/6 high coercitity cards.

(provided 219kA/m(2750 Oe) only, Write is option_

EMV2000 ver 4.0

**Pre-head detect**

ISO/IEC Track 2 or ISO/IEC Track 3

### Shutter gate

1peace, normal closed

### MM sensor bracket (option)

Per appearance drawing

### IC card Read / Write

IC contact location : ISO/IEC7816 Front side lower position
Communication circuit : Exist
Vcc : DC+5V±5% or DC+3V±5% (selected by command), Max 80mA
Vpp : Open
CLK : 3.58 MHz (basis), 7.16 MHz (automatically selected by firmware.)
Baud rate : 6991 – 38490 bps
IC card type : T=0, T=1
PPs : supported.

### Environmental condition

Operating temperature/humidity : 5℃ ~ 50℃, 20% ~ 80% RH
Storage temperature/humidity : -20℃ ~ 70℃, 20% ~ 80% RH
(Condition : Storing ICRW for 12 hours at the normal conditions without any operation after keeping it at the above storage temperature and humidity for 96 hours without operation, no functional error is found.)
Normal conditions : 20℃±5℃, 35%~60% RH
Mounting Horizontal (Mounting plate on horizontal surface)
Maximum limit : 40℃±3℃, 90% ~95%RH, 96 hours
Shock durability : 294 $m/s^2$ (30G), 11ms

### Life

ICRW Unit : 1,000,000 card passes
(One time card pass means the round pass with forward and backward movement.)

### Reliability

Mag-stripe read/write error rate : Less than 1/1,000 cycles
-Condition : at indoor normal condition, card :SANACARD-T5 Flat
-Card feed : 1 cycle/10s
-1 cycle : one Mag-Track Write Command and one Mag-Track Read Command function

IC contact connection Error Rate : Less than 1/10,000 times

-Condition : 1 time = 1 try + 2 retries

-1 try : To carry the card to IC contact position and set IC contact

MTBF (only for PCB) : More than 200,000 hours

## Other functions for reliability

- Self diagnostics
- Photo sensor dirt /age detect using emission amount change of Sensor LED.
- In case of power down, a card under transaction can be conveyed to the card gate by backup power supply which will be provided by customer.
- Definition of power down : Supply voltage – 20V DC or less
  Duration time : over 15m sec

### 9.1.3 Usable card

#### Magnetic card

ISO/IEC 7810, 7811/1-5
ISO/IEC 7811/6 (option) Read is accept

#### IC card

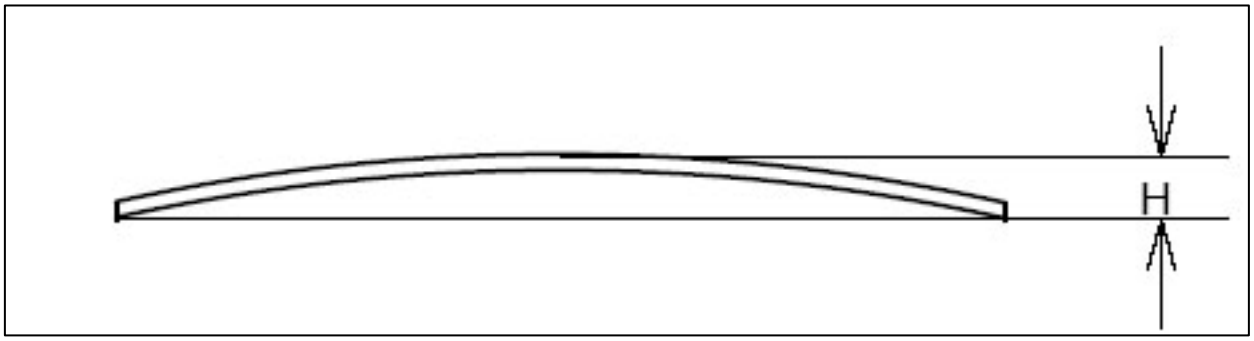
ISO/IEC 7816 (Contact position : Front side, lower position)
EMV '96 ver 3.1.1
EMV2000 ver 4.0
Note: EMV Standard is given higher priority than ISO/IEC Standard when there are any discrepancy between them.

#### Cleaning card

Specification #68-76-02-51-4 (Standard type)
or #68-76-02-51-8 (With mag-stripe type)

#### Warped cards

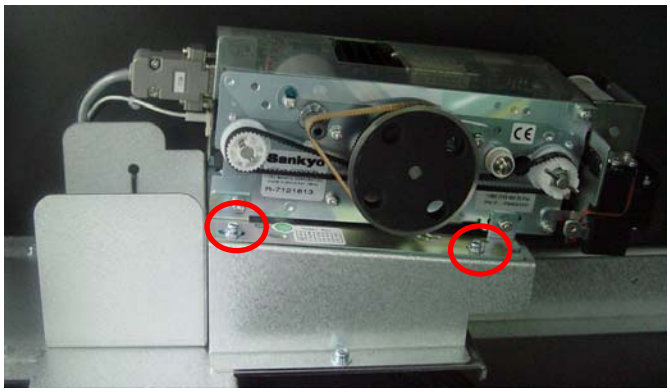
This term refer to an evenly warped card having a height (from the top of the convex surface to the base of the warped edge)

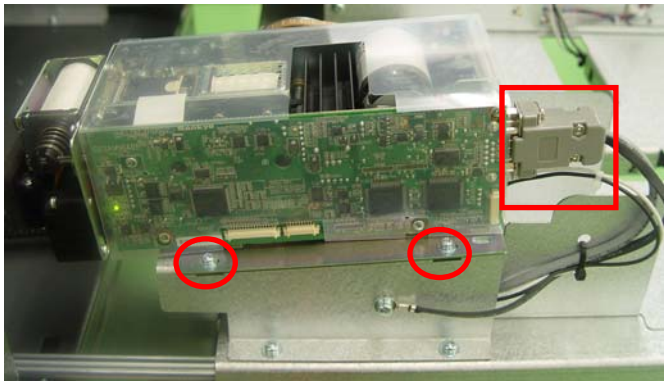



a) "H"≤1.0 mm for able to Card back entry.
b) "H"≤2.5 mm for able to Mag-stripe R/W (only low-slice read)
c) "H"≤2.0 mm for able to IC R/W.
d) "H"> 4.0 mm card jamming will be happened (include card eject in case of power down.)

### 9.1.4 Removal/Installation Procedure of Magnetic Card Unit

1) Open the upper door of the ATM and turn off the power.
2) Remove 4 screws on the both sides of the MCU and disconnect the connector from the MCU to disassemble the MCU.



3) Assemble the MCU in the reverse of the disassembly.

# Chapter 10. Safe Unit

## 10.1 Electronic Lock




### Opening the lock

1. Insert a key for security door into the lock case
   and turn it clockwise until it is stopped.
2. Enter valid six (6) digit combination. (Factory set to 1-2-3-4-5-6)
3. The lock will indicate a valid combination with a double signal.
4. Within four (4) seconds, turn the handle to the open position
   if using a swing bolt style lock.

• If using a dead bolt style lock, turn the keypad to the open position
(clock-wise).

5. Pull door open.

• Invalid Combination - Lock will signal three (3) times.

### Changing the combination

***ALWAYS PERFORM THIS OPERATION WITH THE DOOR OPEN***

*(If your unit is programmed for Dual Mode, each combination must be changed independently. Follow these instructions for each combination change.)*

1. Enter “zero” six times.
2. Enter your existing six (6) digit combination one time.
3. Enter your NEW six (6) digit combination two times.
4. If a mistake is made wait thirty (30) seconds and repeat steps 1 - 3.
5. Test lock operation several times before closing the door.

**CAUTION: When selecting a combination do not use birthday or other predictable data that could give correlation between the user and the combination. Keep the combination secret.**

• Valid Combination - Double signal after valid six (6) digit combination is entered.

• Invalid Combination - Triple signal indicates the old combination is still valid.

### Add user

*(ONLY available if either Manager Mode, Time Delay Override Mode or Dual*

*Mode was activated using the 3045 Hand Held Programmer. Add User is not available if Remote Override feature is activated using the 3045 Hand Held Programmer.)*

***ALWAYS PERFORM THIS OPERATION WITH THE DOOR OPEN***

1. Enter the Manager combination and **hold down last digit of the combination until the lock signals with two sets of double beeps.**
2. **PRESS 1.** Lock signals as follows:
   One beep – User is already installed (end of operation)
   Two beeps – User enabled, go to Step 3
   Three beeps – Not available; Function was not programmed with Hand Held Programmer (end of operation)
3. Enter **NEW** user combination twice. The lock signals twice after each valid entry.
4. If a mistake is made wait thirty (30) seconds and repeat steps 1 - 3.

## Disable user *(Manager only.)*

***ALWAYS PERFORM THIS OPERATION WITH THE DOOR OPEN***

1. Enter the Manager combination and **hold down last digit of the combination until the lock signals with two sets of double beeps.**
2. **PRESS 2.** Lock signals once.
3. User is temporarily disabled. (User combination is saved and will be valid if reinstated)
4. If a mistake is made wait thirty (30) seconds and repeat steps **1 - 3**.

## Reinstate user *(Manager only.)*

***ALWAYS PERFORM THIS OPERATION WITH THE DOOR OPEN***

1. Enter the Manager combination and **hold down last digit of the combination until the lock signals with two sets of double beeps.**
2. **PRESS 1.** Lock signals once.
3. User is reinstated.
4. If a mistake is made wait thirty (30) seconds and repeat steps **1 - 3**.

## Remove user *(Manager only.)*

***ALWAYS PERFORM THIS OPERATION WITH THE DOOR OPEN***

1. Enter the Manager combination and **hold down last digit of the combination until**

**the lock signals with two sets of double beeps.**

2. **PRESS 3.** Lock signals once.
3. User and combination are removed from the lock. (Add User feature is still available.)
4. If a mistake is made wait thirty (30) seconds and repeat steps **1 - 3**.

## Dual mode operation

*(If mode is active. Must be programmed using 3045 Hand-Held Programmer)*

1. Must add User to open lock. (See **ADD USER**)

• User cannot be disabled or removed.

2. If Time Delay is active, one valid combination will start Delay period.

• Both combinations required to open lock in Open period.

## Time delay override

(If mode is active. Must be programmed using 3045 Hand-Held Programmer)

1. Must add User to use this mode. (See **ADD USER**)

• User cannot be disabled or removed.

2. Entering Override User combination during Delay period will open the lock.

## Programmable lock features

*(Time delay and silent alarm features may be combined with any programmable lock mode.)*

## Time delay

*(If feature is active. Must be programmed using 3045 Hand-Held Programmer.)*

1. Entering a valid combination begins the Delay period.

• LED fl ashes at one (1) second intervals.

- If a valid combination is entered during the Delay, then Delay period restarts.
- If an invalid combination is entered during Delay, then the Delay period aborts.

2. At end of Delay period, the Open period begins.

• LED fl ashes at 1/2 second intervals and the entry beeps at ten (10) second intervals.

- If a valid combination(s) is entered during the Open period, then the lock will open.
- If an invalid combination is entered during Open period, then the Open

period continues.

• Four (4) consecutive invalid combinations entered will start the Wrong Try Penalty.

## Silent signal alarm

*(If feature is active AND optional Alarm Box [2789 or 4002] is connected to an alarm system.)*

1. To send an alarm signal enter last digit of combination one number higher or one number lower.

• Example: Combination: 1-2-3-4-5-6

• Duress: 1-2-3-4-5-5 or 1-2-3-4-5-7

2. The lock will open without any indication that the duress signal has been sent.

## Disable lock

*(If feature is active the alarm box [2789 or 4002] is required. ONLY the Manager is available)*

Input signal to the alarm box will disable opening of the lock by a valid combination.

## Wrong try penalty

• Entry of four (4) consecutive invalid combinations starts a fi ve (5) minute delay period.

- LED fl ashes at ten (10) second intervals.

• At the end of the delay period, two more consecutive invalid combinations will restart the five (5) minute delay period.

**Entry will not respond to keystrokes during delay period.**

## Battery low warning

Repeated LED flashing and beeping during an opening indicates that the battery is low and needs immediate replacement.

• Uses alkaline battery only. (Example: Duracell™ or Eveready™ alkaline batteries.) It is recommended that batteries are replaced at least once a year.

• For battery replacement instructions, see the input unit's "User Operating" guide.

**Lock contains a nonvolatile memory; even with batteries removed the lock will retain all programming.**

## 10.2 Mechanical Lock




### Opening the Security Door

1) Turn the dial lock to unlock the security door.
   Please refer to “How to open the mechanical combination lock” for the detailed descriptions.
2) Insert the setup key into the lock case and turn to the clockwise until it is stopped.
3) Then turn the handle clockwise and open the safe door.

### Closing the Security Door

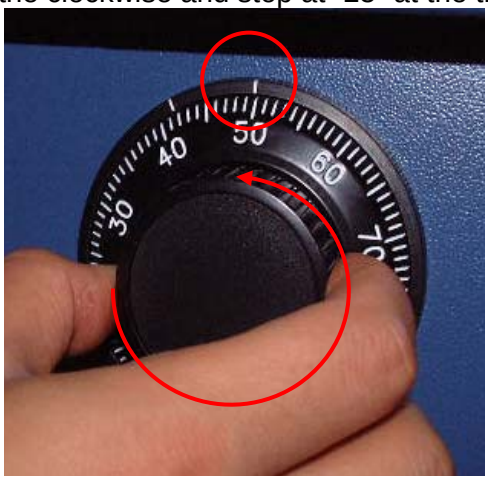
1) Close the Safe Door and turn the handle counterclockwise.
2) Then turn the dial to lock the security door.
3) Insert the setup key into the lock case, turn to the counterclockwise, and the safe door will be closed.

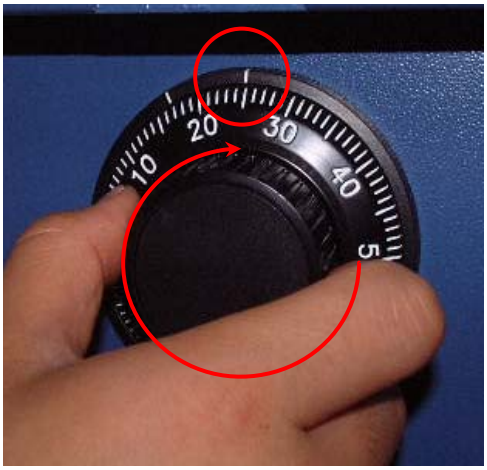
## How to open the mechanical combination lock

Make sure that this lock would be set 50-25-50 as factory default setting.

1) Turn to the counterclockwise for more than four times and set to “50.”

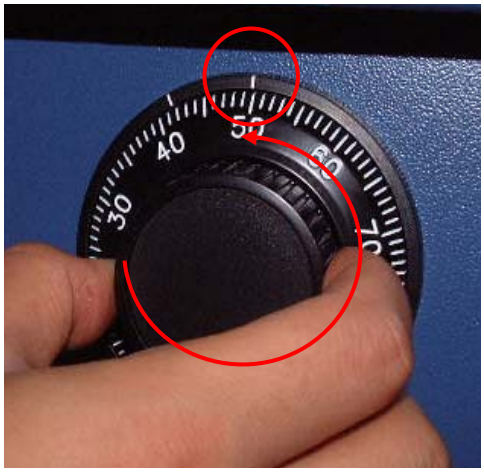
2) Turn to the clockwise and stop at “25” at the third times.




3) Turn to the counterclockwise and stop at “50” at the second times.

4) Turn to the clockwise until the dial does not move any more.







**Note**: The center scale mark is used to open the safe unit

5) The safe door will open when turning the handle to counterclockwise.

## How to set the new password

For example, let's assume that you would like to set the following number (10-50-70)

1) Open the safe door as described in the above.
2) To close the mechanical lock, turn the handle to clockwise with the door opening
3) Turn to the counterclockwise for more than four times and set to “50” at left scale indicator as shown in the Fig.10.1.
4) Turn to the clockwise and stop at “25” at the third time as shown in the Fig.10.2.
5) Turn to the counterclockwise and stop at “50” at the second times as shown in the Fig.10.3.

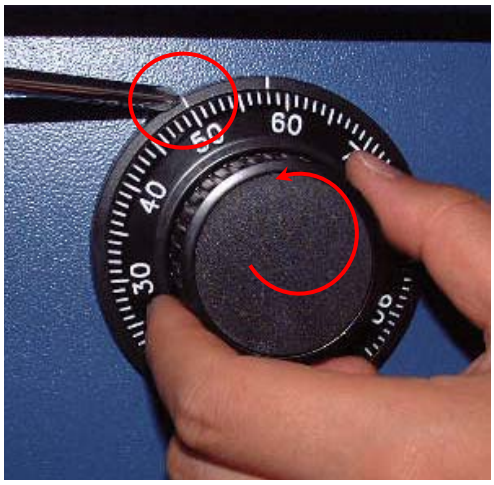



Fig.10.1

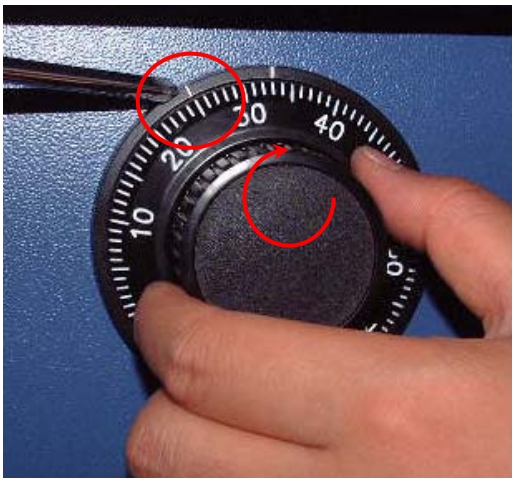



Fig.10.2




Fig.10.3

**Note:** The left scale mark is used to change the password.

6) Push the change bar completely until it is held by the dial change home (Fig.10. 4) inside the safe door and turn to the clockwise by 90 degrees (Fig.10.5).

.

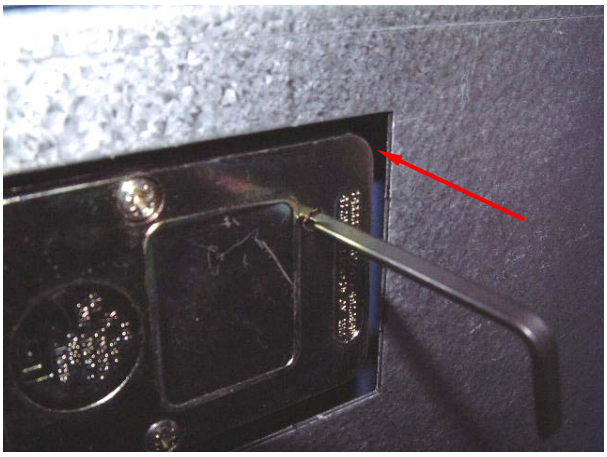


Fig.10.4



Fig.10.5

7) Turn to the counterclockwise more than four times and position at left scale indicator to “10” (target number to change).

8) Turn to the clockwise for three times and position the scale to “50” (target number to change).

9) Turn to the counterclockwise for two times and position the scale to “70” (target number to change).




Fig.10.6

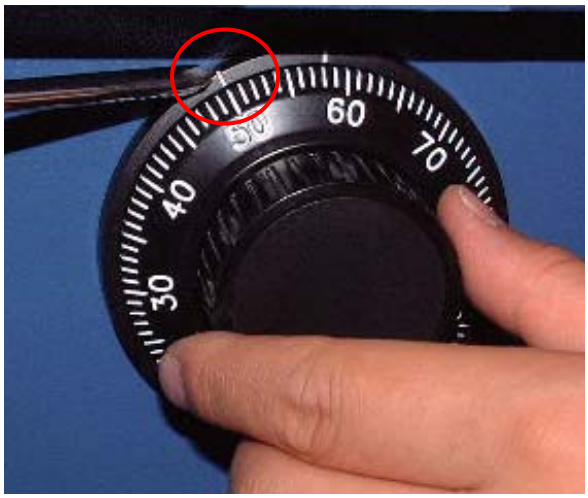



Fig.10.7

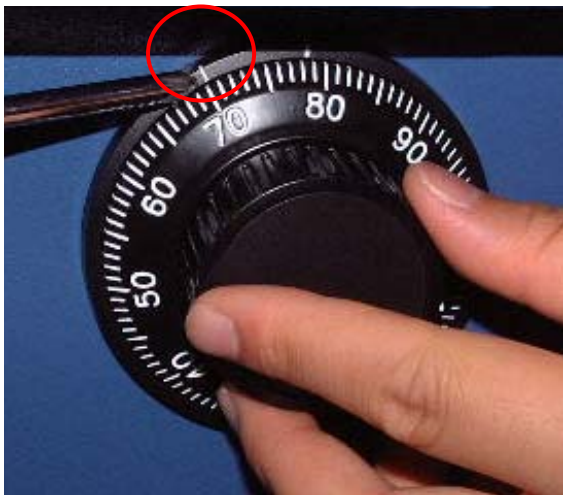



Fig.10.8

Note: Do not use number 25 – 35 as the last password number.

10) When password setting is completed, turn the change bar counterclockwise and remove it from the safe as shown in the Fig.10.9.

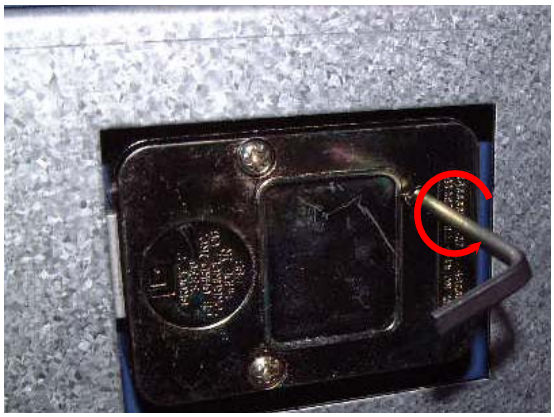


Fig.10.9

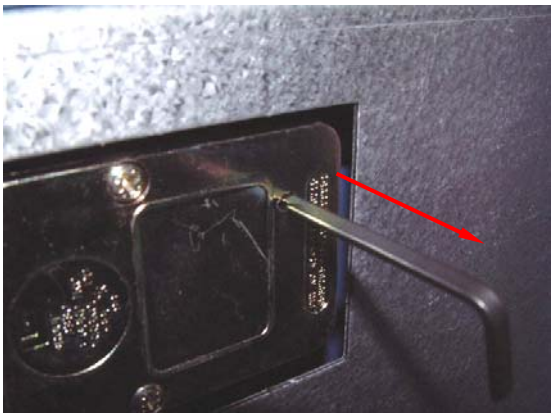


Fig.10.10

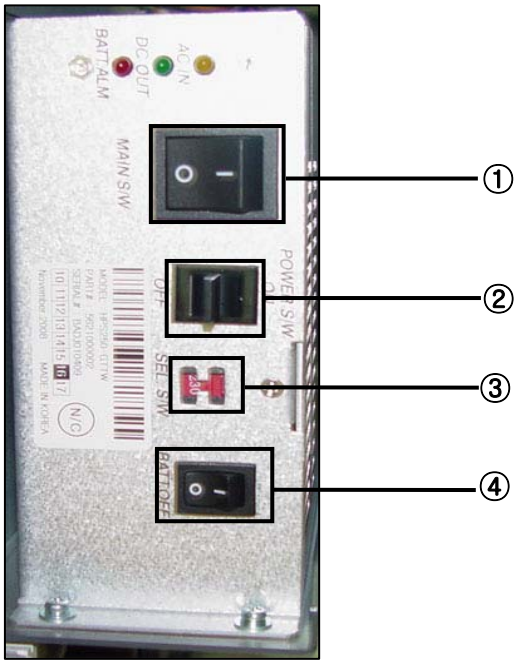
11) When password setting is completed, try to turn the dial more than a couple of times while the door is open to see if the door is opened or not. (Make sure to run the open/close test for at least two or three times.)

12) When all setting is completed, inform the password to the person in charge while paying attention to password disclosure or lost.

Note: Special attention must be paid and lost dial number cannot be restored.

# Chapter 11. Power Supply

## 11.1 Appearance




①Main Switch ②Standby Switch ③ Select Switch
④Battery Switch

Fig. 11.1 Power Supply Appearance

### System Power On

1) Turn on Battery Switch.
2) Turn on Main Switch.

### System Power Off

1) Push down Power Switch for 1 second and then system will be shut down automatically.
2) Turn off Battery Switch after shutdown is finished..

### Warning

**Don't operate Main Switch on power supply when you would like to turn off the power.**
**It may cause damage to operate system or destabilize control electronics in ATM**

## 11.2 Block Diagram

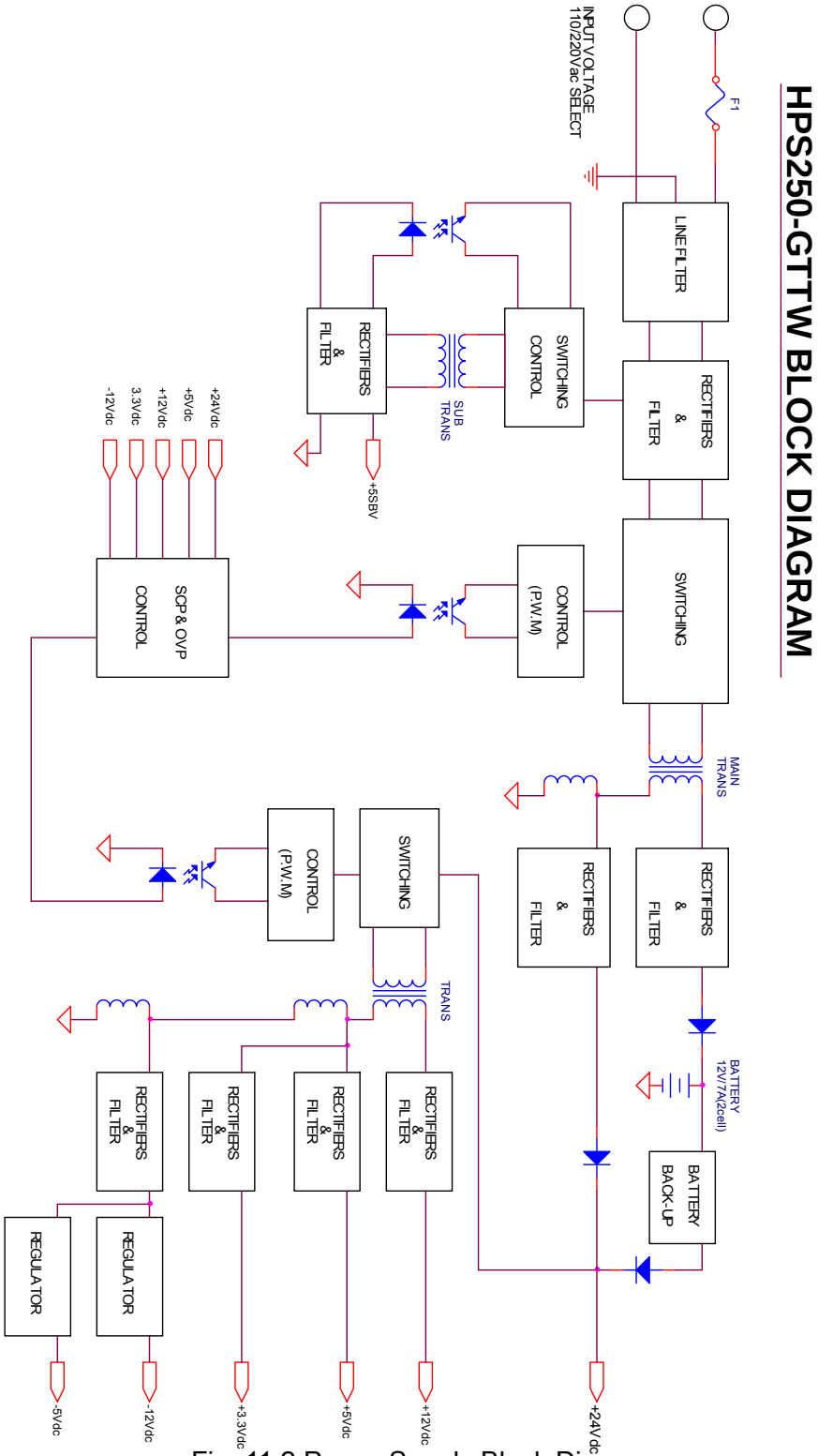



Fig. 11.2 Power Supply Block Diagram

## 11.3 Specifications

### 11.3.1. Environment Condition

| CONDITION | OPERATING | STORAGE | | CONDITION | OPERATING | MOVEMENT |
|---|---|---|---|---|---|---|
| TEMPERATURE | -5 ~ 45℃ | -40 ~ 70℃ | | VIBRATION | 0.5G | 2.0G |
| HUMIDITY | 30 ~ 90% | 10 ~ 90% | | IMPACT | 5.0G | 10.0G |
| M.T.B.F | 30,000Hrs | | | | | |

Table 11.1 Environment Condition

### 11.3.2. Mechanical Specification

| DIMENSION(MAIN) | 350(L) x 160(W) x 75(H) | | CASE COLOR | - |
|---|---|---|---|---|
| CASE MATERIAL | GALVA 1.6t | | CASE DRAWING NO. | - |
| WEIGHT | About 2.5Kg | | MODEL LABEL | UL94-V0 |

Table 11.2 Mechanical Specification

### 11.3.3. Withstanding Voltage & Insulation Resistance

| DIVISION | TEST POINT | TEST INPUT VOLTAGE | TEST CONDITION |
|---|---|---|---|
| WITHSTANDING VOLTAGE | * PRI – SEC | * 3.0 Kvac(1.5KVac) | DURING OF TEST: 1 min<br>CUTOFF CURRENT: 10mA |
| | PRI - F.G | 1.5 Kvac | |
| INSULATION RESISTANCE | PRI – SEC | 500 Vdc | DURING OF TEST: 1 min<br>INSULATION RES: ≥10Mohm |
| | PRI - F.G | 500 Vdc | |

NOTE 1) * PRE – SEC WITHSTANDING VOLTAGE CONDITION : Y-CAP DELETE(3KVac) / NO DELETE(1.5KVac)

Table 11.3 Withstanding Voltage and Insulation Resistance

### 11.3.4. Input Specification

| DIVISION | SPECIFICATION |
|---|---|
| INPUT CONNECTION | INLET FILTER(250Vac 6A) |
| INPUT VOLTAGE / CURRENT (SELECTION MODE) | 100~127Vac ±10% / 5.5A<br>200~240Vac ±10% / 2.8A |
| FREQUENCY | 47~63Hz(NORMAL:50/60Hz) |
| DISTORTION | 10% |
| EFFICIENCY | 70% MIN(at MAX LOAD) |
| HOLD-UP TIME | 16.7ms MIN |
| INRUSH CURRENT | 60A MAX |
| LEAKAGE CURRENT | 3.5mA MAX |

Table 11.4 Input Specification

### 11.3.5. Output Specification

1) Main Output

| DIVISION | SPECIFICATION | | | | | | UNIT |
|---|---|---|---|---|---|---|---|
| CHANNEL | +3.3 | +5.0 | -5.0 | +12.0 | -12.0 | +24.0 | Vdc |
| VOLTAGE | 3.14 ~ 3.47 | 4.75 ~ 5.25 | -4.75 ~ -5.25 | 11.4 ~ 12.6 | -11.4 ~ -12.6 | 22.8 ~ 25.2 | Vdc |
| CURRENT | 0 ~ 6.0 | 2.0 ~ 13.0 | 0 ~ 0.2 | 0.2 ~ 5.5 (Peak6.5A) | 0 ~ 0.2 | 0 ~ 4.0 (Peak11A) | A |
| METHOD | SWITC-HING | SWITCH-ING | SW & REG | SWITCHING | SW & REG | SWITCHING | MODE |
| RIPPLE | 50 | 50 | 50 | 120 | 120 | 500 | mVp-p |
| NOISE | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 1.0 | Vp-p |
| SHOOT | ±3 | ±3 | ±3 | ±4 | ±4 | ±5 | % |
| O.V.P | 3.76 ~ 4.3 | 5.74 ~ 7.0 | - | 13.4 ~ 15.6 | - | 26.5 ~ 34.0 | Vdc |
| O.C.P | S.C.P | S.C.P | S.C.P | S.C.P | S.C.P | S.C.P | A |

NOTE 1) +24V SHORT CIRCUIT PROTECTION: SHUT-DOWN or RELAY(P-OFF) ACTION

Table 11.5 Main Output

2) Sub Output

| DIVISION | SPECIFICATION | | | UNIT |
|---|---|---|---|---|
| CHANNEL | +5VSBV(Stand-by) | BATTERY(Charge) | BATTERY(Discharge) | Vdc |
| VOLTAGE | 4.75 ~ 5.25 | 26.5 ~ 27.6 | 24.0 | Vdc |
| CURRENT | 0 ~ 0.5 | 0.3 | 6.0 | A |
| METHOD | SWITCHING | SWITCHING | BATTERY | MODE |
| RIPPLE | 50 | - | - | mVp-p |
| NOISE | 0.3 | - | - | Vp-p |
| SHOOT | ±3 | - | - | % |
| O.V.P | - | - | - | Vdc |
| O.C.P | S.C.P | 0.7 ~ 0.9 | FUSE | A |

NOTE 1) Ripple & Noise Test Condition : 20MHz, 10uF(ELEC)/0.1uF(CER)

2) S.C.P: Short Circuit Protection

3) For ensure U.P.S function, +24Vdc output of which power less than 150W, of battery must be continued for a minute when full charged(Charged for a day)

4) Stand-by D.C output go on while A.C input don't turned off, neglect P ON-N signal

5) Current of A.C input is 3.9A when 115Vac applied

Table 11.6 Sub Output

### 11.3.6. Requirements

1) Use the lamp of power supply as below
- YELLOW LED: A.C INPUT(turn on if A.C input is normal)
- GREEN LED: D.C OUTPUT(turn on if D.C output is normal)
- RED LED: BATTERY ALARM(turn on if battery output is abnormal)

2) Apply extra outlet
- 100~127Vac / 1.0A
- 200~240Vac / 0.5A

3) Power Distribution

| NO. | +3.3V/20W MAX | +5V/65W MAX | +12V/66W MAX | REMARK |
|---|---|---|---|---|
| 1 | 20W less than | 64W less than | 36W less than | Total output shall not exceed 120W |
| 2 | 20W less than | 64W ~ 40W | 36W ~ 60W | |
| 3 | 14W less than | 46W more than | 60W more than | |

Table 11.7 Power Distribution

### 11.3.7. Signal Output Specifications

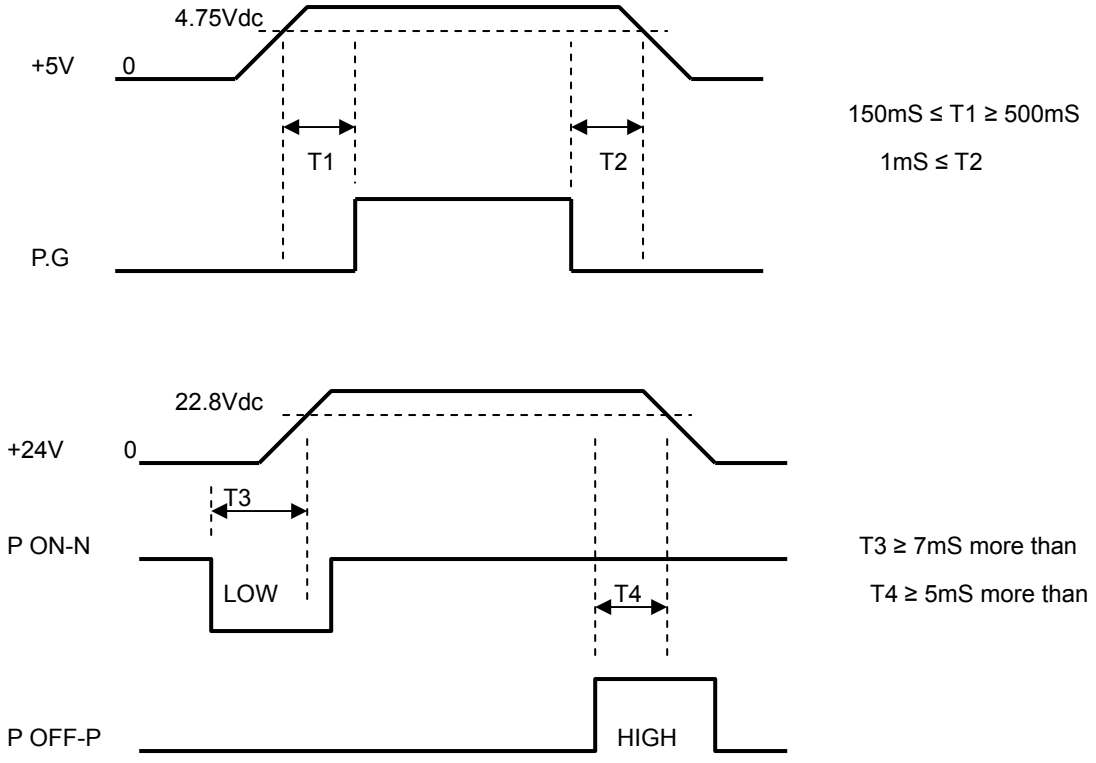



Fig. 11.3 Signal Output Specifications

### 11.3.8. Connector Configuration

1) AC In

| DIVISION | PIN NO. | CONFIGURATION | SIZE | COLOR | REMARK |
|---|---|---|---|---|---|
| CN-IN | 1 | L | 18AWG/UL1015 | BLACK | AMP (1-480701-0) |
| | 2 | F.G | 18AWG/UL1015 | GRN/YEL | |
| | 3 | N | 18AWG/UL1015 | WHITE | |

Table 11.8 Connector Configuration

2) MBD

| DIVISION | PIN NO. | CONFIGURATION | SIZE | COLOR | REMARK |
|---|---|---|---|---|---|
| CN1 | 1 | S.G | 18AWG/UL1007 | BLACK | MOLEX (5569-20P) |
| | 2 | S.G | 18AWG/UL1007 | BLACK | |
| | 3 | S.G | 18AWG/UL1007 | BLACK | |
| | 4 | S.G | 18AWG/UL1007 | BLACK | |
| | 5 | S.G | 18AWG/UL1007 | BLACK | |
| | 6 | S.G | 18AWG/UL1007 | BLACK | |
| | 7 | +5V | 18AWG/UL1007 | RED | |
| | 8 | +5V | 18AWG/UL1007 | RED | |
| | 9 | +24V | 18AWG/UL1007 | WHITE | |
| | 10 | -5V | 18AWG/UL1007 | ORANGE | |
| | 11 | P-ON-N | 18AWG/UL1007 | GREEN | |
| | 12 | +5VSBV | 18AWG/UL1007 | PURPLE | |
| | 13 | S.G | 18AWG/UL1007 | BLACK | |
| | 14 | S.G | 18AWG/UL1007 | BLACK | |
| | 15 | S.G | 18AWG/UL1007 | BLACK | |
| | 16 | POWER GOOD | 18AWG/UL1007 | GRAY | |
| | 17 | -12V | 18AWG/UL1007 | BLUE | |
| | 18 | +5V | 18AWG/UL1007 | RED | |
| | 19 | +5V | 18AWG/UL1007 | RED | |
| | 20 | +12V | 18AWG/UL1007 | YELLOW | |

Table 11.9 MBD

3) SHU

| DIVISION | PIN NO. | CONFIGURATION | SIZE | COLOR | REMARK |
|---|---|---|---|---|---|
| CN3 | 1 | +5V | 18AWG/UL1007 | RED | MOLEX (5569-08P) |
| | 2 | +24V | 18AWG/UL1007 | WHITE | |
| | 3 | +12V | 18AWG/UL1007 | YELLOW | |
| | 4 | S.G | 18AWG/UL1007 | BLACK | |
| | 5 | -12V | 18AWG/UL1007 | BLUE | |
| | 6 | +24V | 18AWG/UL1007 | WHITE | |
| | 7 | S.G | 18AWG/UL1007 | BLACK | |
| | 8 | S.G | 18AWG/UL1007 | BLACK | |

Table 11.10 SHU

4) PNC

| DIVISION | PIN NO. | CONFIGURATION | SIZE | COLOR | REMARK |
|---|---|---|---|---|---|
| CN6 | 1 | S.G | 18AWG/UL1007 | BLACK | MOLEX (5569-06P) |
| | 2 | S.G | 18AWG/UL1007 | BLACK | |
| | 3 | +12V | 18AWG/UL1007 | YELLOW | |
| | 4 | +24V | 18AWG/UL1007 | WHITE | |
| | 5 | P ON-N | 18AWG/UL1007 | GREEN | |
| | 6 | +5V | 18AWG/UL1007 | RED | |

Table 11.11 PNC

5) MCU

| DIVISION | PIN NO. | CONFIGURATION | SIZE | COLOR | REMARK |
|---|---|---|---|---|---|
| CN10 | 1 | S.G | 18AWG/UL1007 | BLACK | MOLEX (5569-06P) |
| | 2 | S.G | 18AWG/UL1007 | BLACK | |
| | 3 | +12V | 18AWG/UL1007 | YELLOW | |
| | 4 | +24V | 18AWG/UL1007 | WHITE | |
| | 5 | P ON-N | 18AWG/UL1007 | GREEN | |
| | 6 | +5V | 18AWG/UL1007 | RED | |

Table 11.12 MCU

6) +3.3V

| DIVISION | PIN NO. | CONFIGURATION | SIZE | COLOR | REMARK |
|---|---|---|---|---|---|
| CN8 | 1 | +3.3V | 16AWG/UL1007 | BROWN | MOLEX (5559-02P) |
| | 2 | S.G | 16AWG/UL1007 | BLACK | |

Table 11.13 +3.3V Power

7) Battery

| DIVISION | PIN NO. | CONFIGURATION | SIZE | COLOR | REMARK |
|---|---|---|---|---|---|
| CN-BAT | 1 | BATTERY(+) | 18AWG/UL1015 | WHITE | AMP (1-480703-0) |
| | 2 | BECH-N | 18AWG/UL1015 | BLACK | |
| | 3 | BATTERY(-) | 18AWG/UL1015 | BLACK | |
| | 4 | N.C | - | - | |

Table 11.14 Battery

5) OPL

| DIVISION | PIN NO. | CONFIGURATION | SIZE | COLOR | REMARK |
|---|---|---|---|---|---|
| CN11 | 1 | +24V | 18AWG/UL1007 | WHITE | MOLEX (5569-04P) |
| | 2 | +24V | 18AWG/UL1007 | WHITE | |
| | 3 | S.G | 18AWG/UL1007 | BLACK | |
| | 4 | S.G | 18AWG/UL1007 | BLACK | |

Table 11.15 OPL

8) SPL

| DIVISION | PIN NO. | CONFIGURATION | SIZE | COLOR | REMARK |
|---|---|---|---|---|---|
| CN11 | 1 | +24V | 18AWG/UL1007 | WHITE | MOLEX (5569-04P) |
| | 2 | +24V | 18AWG/UL1007 | WHITE | |
| | 3 | S.G | 18AWG/UL1007 | BLACK | |
| | 4 | S.G | 18AWG/UL1007 | BLACK | |

Table 11.16 SPL

9) Miscellaneous

| DIVISION | PIN NO. | CONFIGURATION | SIZE | COLOR | REMARK |
|---|---|---|---|---|---|
| CN11 | 1 | +24V | 18AWG/UL1007 | WHITE | MOLEX (5569-04P) |
| | 2 | +24V | 18AWG/UL1007 | WHITE | |
| | 3 | S.G | 18AWG/UL1007 | BLACK | |
| | 4 | S.G | 18AWG/UL1007 | BLACK | |

Table 11.17 Miscellaneous

### 11.3.9. Power Interface

| PIN NO. | PIN NAME. | ACTIVE (INACTIVE) | DESCRIPTION | IN/OUT |
|---|---|---|---|---|
| 1 | P OFF-P | +5V(0V) | Application software turn P/S off | IN |
| 2 | S.G | - | | - |
| 3 | P ON-N | 0V(OPEN) | Stand-by switch used to turn P/S on | IN |
| 4 | S.G | - | | - |
| 5 | BATT OFF-N | 0V(+5V) | When #7 signal go active CE module Make this signal active then P/S turned off | IN |
| 6 | S.G | - | | - |
| 7 | AC STOP-N | 0V(+5V) | When a stoppage of A.C power occur (While U.P.S run) this signal activated | OUT |
| 8 | S.G | - | | - |
| 9 | BATT LOW-N | 0V(+5V) | Active of this signal means battery should Replaced, display of error code required | OUT |
| 10 | S.G | - | | - |
| 11 | P OFF-N | 0V(OPEN) | Stand-by switch go to off position | OUT |
| 12 | N.C | - | | - |

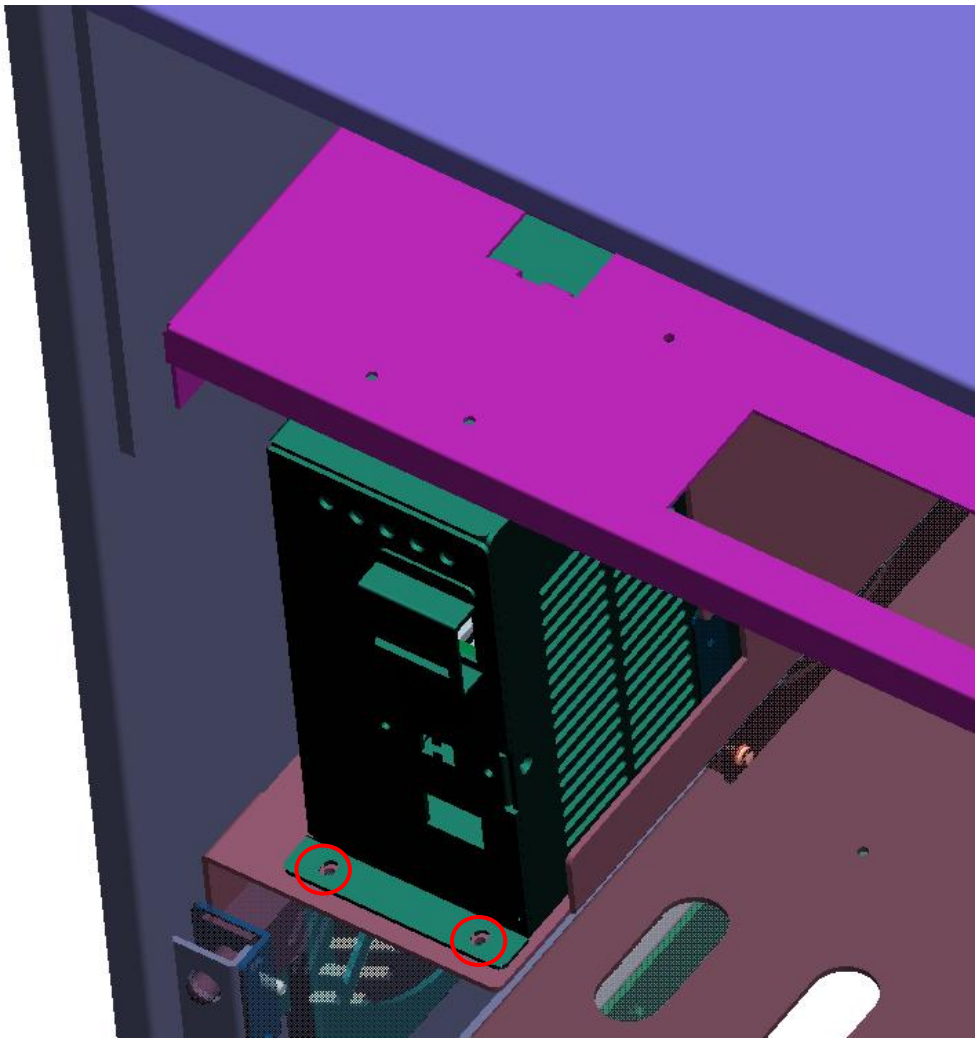
NOTE 1) CABLE UL1007 22AWG

2) CONNECTOR MOLEX 5559-12P

Table 11.18 Power Interface

## 11.4 Power Supply Assembly

1. Insert Main Power into the Power Assembly Hole.
2. Tighten screws for fixing Power assembly.
   - 2 places
3. Then insert the connectors.



## 11.5 Checking Power Supply Status

### 11.5.1 When the LED for displaying power supply status is off :

1. Check A.C power
2. Check Power Cord connection status
3. Check Main Switch status (I/O)
4. Check Fuse inside of Power Supply
   - Remove 6 screws on Power Supply Case Cover.
   - Check Fuse (F1, F201) Open/Short inside of Power Supply.
   * Be sure to check the status after unplugging A.C power cord.

### 11.5.2 When the LED for displaying power supply status is on :

1. YELLOW(S) LED lights up : Stand-by off or +24Vdc output abnormal status
   - Turn on Stand-by switch.
   - After disassembling D.C output connector, turn on Stand-by switch.

2. RED(P) LED lights up : D.C output abnormal status
   - Switch on if a certain time goes by after turning off main switch.
   - Switch on if a certain time goes by after turning off main switch and disassembling D.C output connector.

## 11.6 Battery

### 11.6.1 Introduction

In case of emergencies like temporary blackout or power failure, battery will automatically operate to warrant completely customer's transaction and return his or her card. In addition, this backup equipment is essential in ATM to protect control electronics installed in ATM for the purpose of finishing application program through normal operation process even though not supporting power regularly

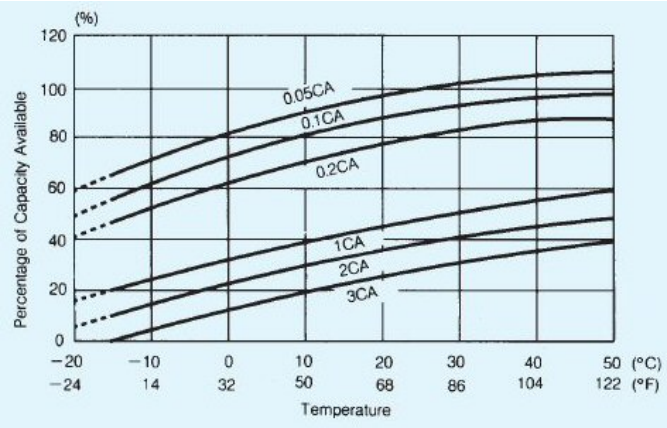


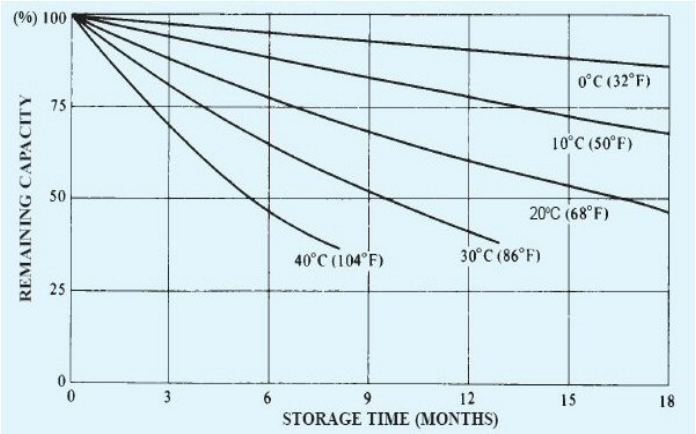

### 11.6.2 Technical Features

1) Non-Spillable Sealed Construction
2) Absorptive Glass Mat System (AGM System)
3) ABS (Acrylonitrile Butadiene Styrene) container and cover
4) Gas Recombination
5) Maintenance-Free Operation
6) Low Pressure Venting System
7) Heavy-Duty Grids
8) Low Self-Discharge-Long Shelf Life
9) Wide Operating Temperature Range
10) High Recovery Capability

### 11.6.3 Characteristic curve on environment

As the ambient temperature rises, the available capacity of battery increase while the capacity decreases as the ambient temperature lowers. The below left figure shows the temperature effects in relation to the battery capacity. In addition, the self-discharge rate of this battery is approximately 3% per month when battery are stored at an ambient temperature of 20℃ (68F). The self-discharge rate varies with ambient temperature. The below right figure shows the relation between the storage time at various temperatures and the remaining capacity

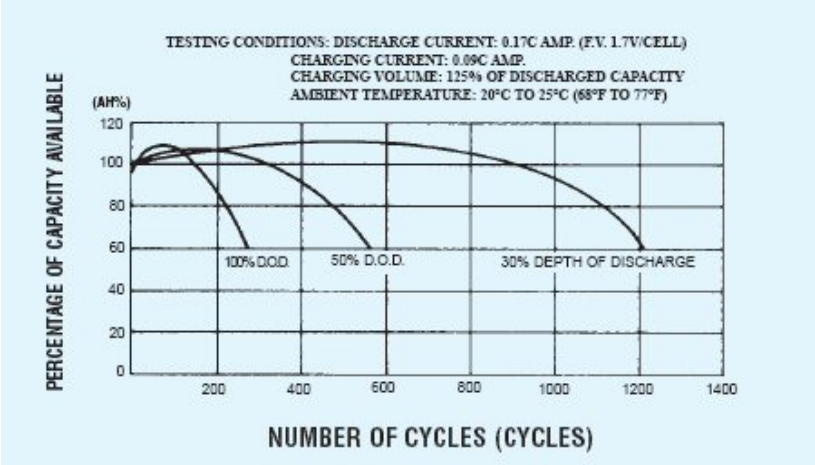



### 11.6.4 Service Life

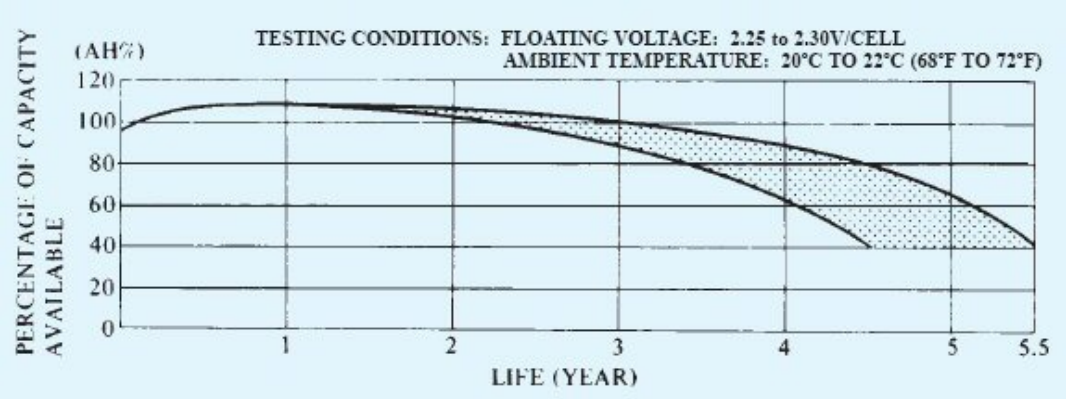
1) Cycle Life

There are a number of factors that affect the length of cyclic life of battery. Major factors are the ambient operating temperature, the discharge rate, the depth of discharge and the manner in which the battery is recharged, of which the most important factor is the depth of discharge. The following figure shows the effects of depth of discharge on cycle life. The relation between the expected number of cycles and the depth of discharge is apparent.



2) Float Life

This battery is designed to operate in standby(Float) use up to 5 years on a normal service condition. Following figure shows the float life characteristics of this battery when discharged once every three months up to 100% depth of discharge.




### 11.6.5 Charging method

Proper charging is one of the most important factors when using this battery. Battery performance and service life are directly affected by the charging method used. Followings are the charging instructions recommendable.

1) Standby use

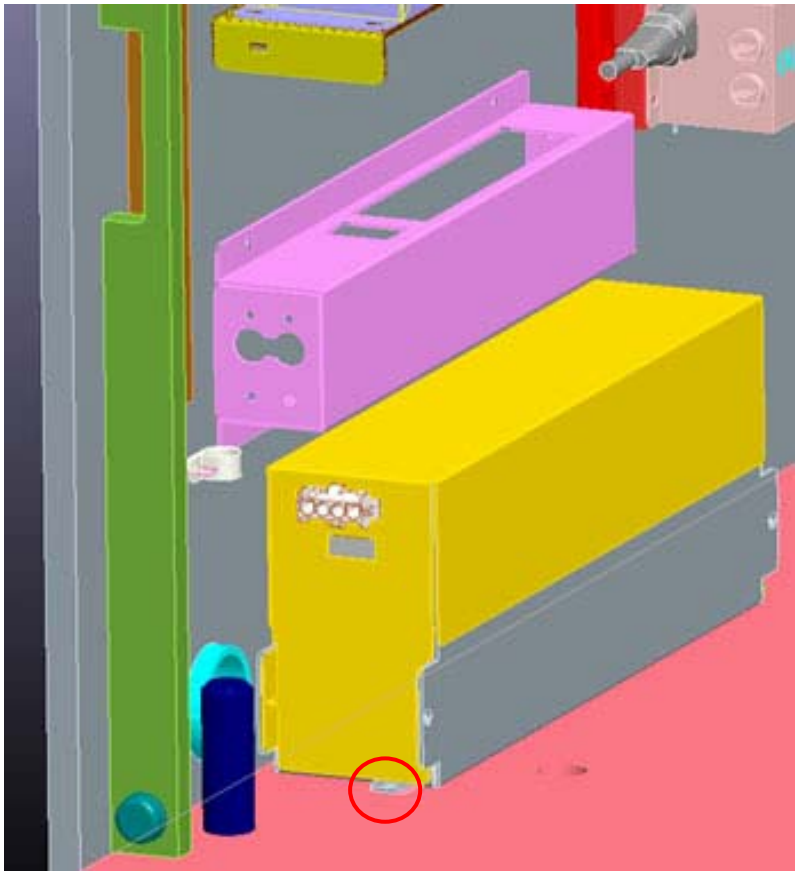
No current limit is required and charging voltage should be in the range of 2.25V/cell ~ 2.30V/cell at 25℃ (77F)

2) Cycle use

Maximum charging current is 0.25 and charging voltage is 2.40V/cell to 2.50V/cell at 25℃ (77F)

### 11.6.6 Assembling battery assembly

1. Mount the Battery on the lower body.
2. Screw up a fixing screw for Battery.



# Chapter 12. Journal Printer

# 12.1 MDP350 (*Dot Matrix Journal Printer)*

## 12.1.1 Introduction

### Basic Features

This section will describe the rolls of each main part for DOT JPR.

**Schematics of Memory**

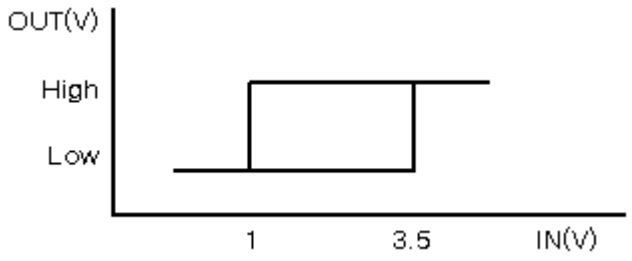
| | | |
|---|---|---|
| **A** | Flash Memory | 4Mb, 16Mb (MASK ROM : 16Mb) |
| **B** | RAM | 4Mb |
| **C** | Usable Memory Space | 512Kbyte with 2Mbyte of extension memory |

**PRODUCTION INFORM :**

Memory space between “00000H-08000H” is reserved for CPU SFR and RAM by CPU.

### Sensor Ports

To dispatching the noises on 1st signal entrance level, we are installing “RC Low Path Filter”. Hysteresis distinctive by OP AMP is used for Secondary noise Filter to grantee stability activation. Based on 1V~3.5V of input range, Hysteresis distinctive is entitled to activate.




### Paper Detection Sensor

Paper detection sensor which is installed at step back side from ***DOT Header*** and can detect paper Position whether it correct or not.

If there have no paper on paper tray (Indicate Signal = High), turn on the ***PAPER OUT LED***.
This function is not related to Printing but report to host paper out warning.
If 19mm of inner diameters were used for paper roll, near end sensor will detect paper out when the paper roll becomes 30mm diameter and amount of paper remaining is 3-4M.

**Carriage Home Sensor**

Will detect position of carriage
If the carriage can't return to default position according to Paper Jam or mechanical problem, this sensor will detect (Indicate signal = Low) and displaying ***Error LED.***

**Power Control**

Power controller conducting DC regulation from 24VDC input source to +5VDC range to drive internal Logic.

| | | |
|---|---|---|
| **A** | +24VDC | DOT HEAD, ROLL and Line Feed, Carriage Motor |
| **B** | +5VDC | CPU, Buffers |



**PRODUCTION INFORM :**

Power usage : +24V (2.0A) / +5V (700mA)

**LED / KEY PARTS**

Each LED is activated by transistor (UMD3M)
3 colors of LEDs are indicating for POWER (Green), PAPER OUT (YELLOW) and ERROR (RED).

2 Keys are available to proceeding Line Feeding, Backward Feeding, Version Printing, and Character Printing for diagnostic.

| | | |
|---|---|---|
| **A** | BACK FEED Button | Paper backward feeding |
| **B** | BACK FEED Button + Unit Power ON | Printing Font and Characters from Font ROM. |

| | | |
|---|---|---|
| **C** | FEED Button | Paper Forward Feeding |
| **D** | FEED Button + Unit Power ON | Printing Unit Configuration, ROM Version and Test Pattern |

**DOT HEADER**

To grantee the stability of transferred data, ***COMS(HCO5)*** and ***STA471A Solenoid Driver*** is used.
In additional, Timer control on +5VDC level will complement stability of DOT Header.

**Carriage Motor / Line Feed Motor Control**

Through a pair of rated currents the Drive PM Stepping Motor is handled.
For the accuracy of Motor driving Driver IC (UDN2916B) is using.
Capacity of the power for this Driver IC is 1A Peak and 350mA for the Motor.

**Paper Roll Motor**

To perform Paper winding, DC Motor is used for this part and for the driver TR (2SD2143) is installed.
Capacity of the power for Driver TR is 2A Peak and 400mA for the Motor.

**Detecting Header Temperature**

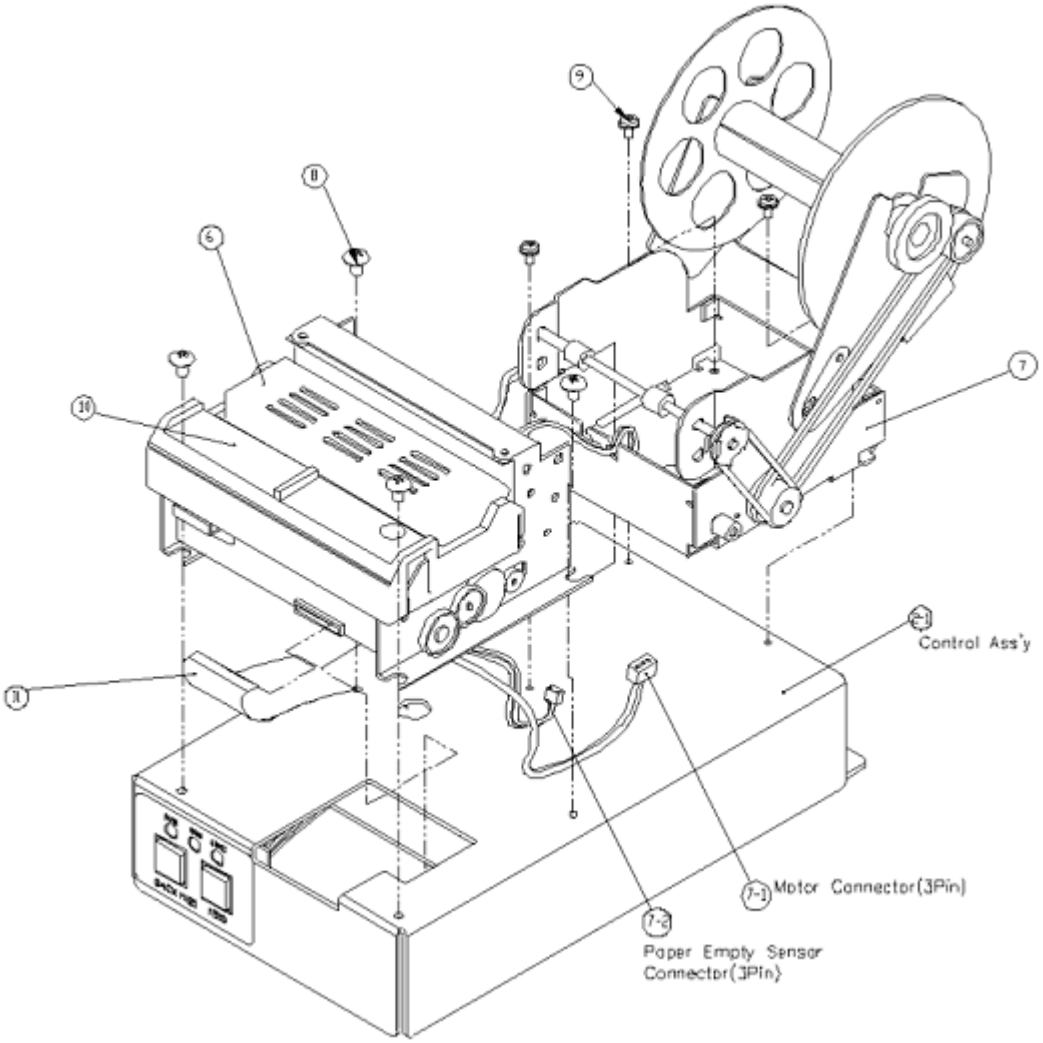
Heat detection on Header is one of key function on Printer to prevent malfunction or header damage.
***ADC sensor*** is detecting header temperature by variable range of voltage which is affected from
The variables register range on Dot Header Thermistor.

This detection sensor is purposed to make Printer stop when header's temperature become 120°C.
If there has no Heat detection function Header can be burned out.
When over heating is detected, Printer will stop with Error LED and idle status will steady until temperature turned down to 90°C.

**Serial Communication**

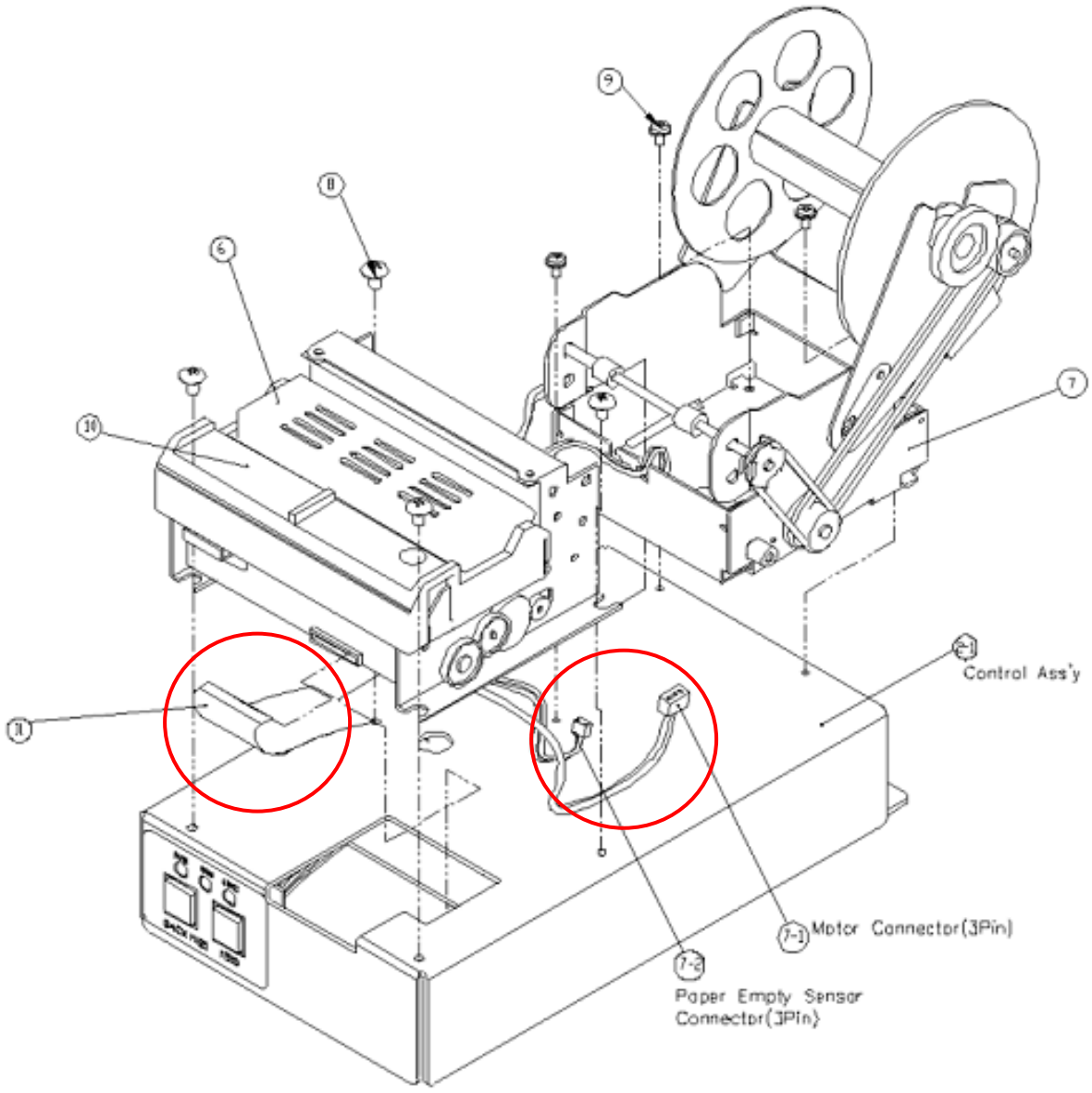
RS-232C Serial is required to communicate with Control PC.
At the least 4 signal pins (TXD, RXD, RTS, CTS) need to configure RS-232C.
4,800 bps ~ 38,400 bps of line speed is available and user selectable.

## 12.1.2 Disassembly & Reassembly

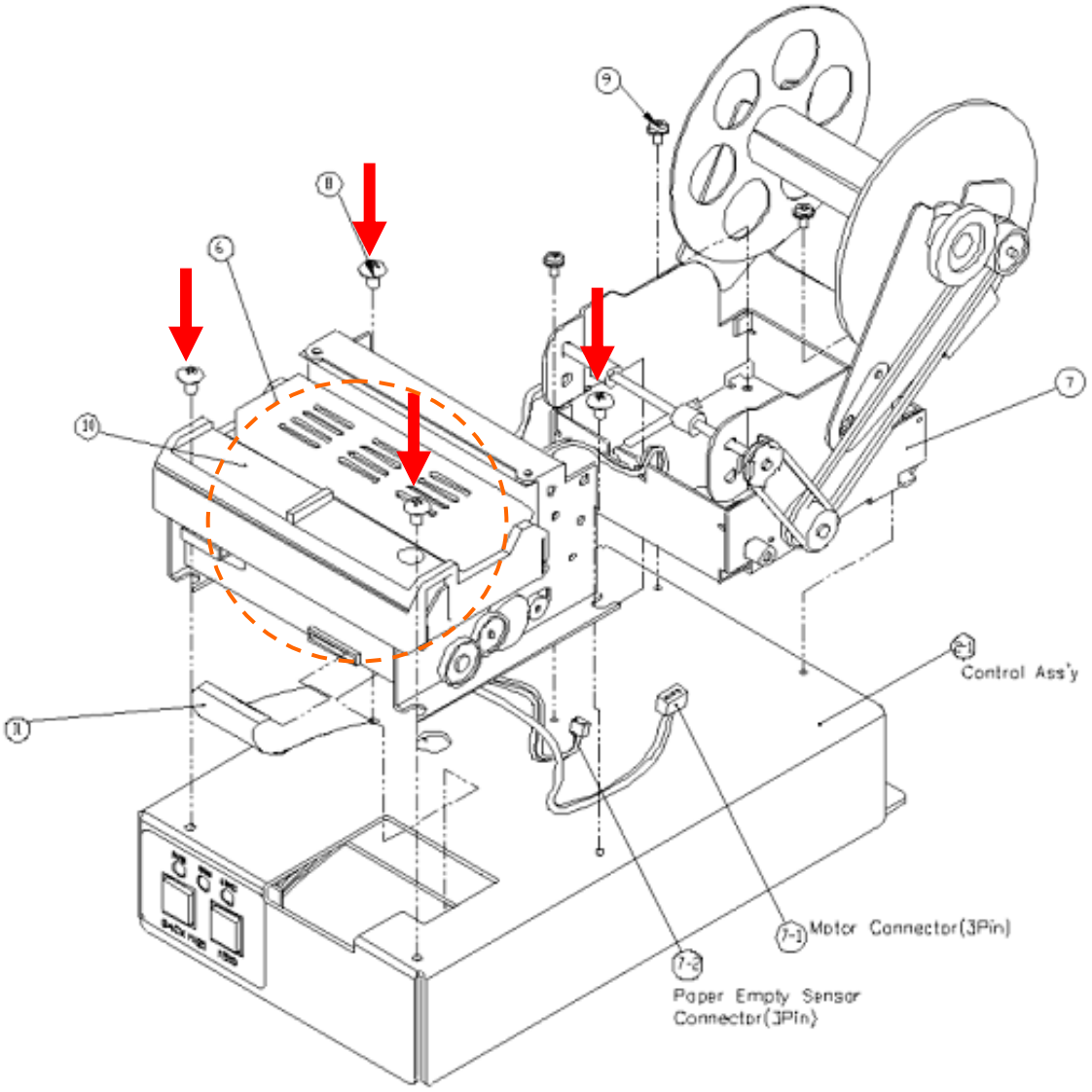


## DISASSEMBLEY

### *Printer Module & Paper Holder*




- Unplug 7-1, 7-2 Connector from Control Board
- Unplug 11 FFC Cable from Control Board

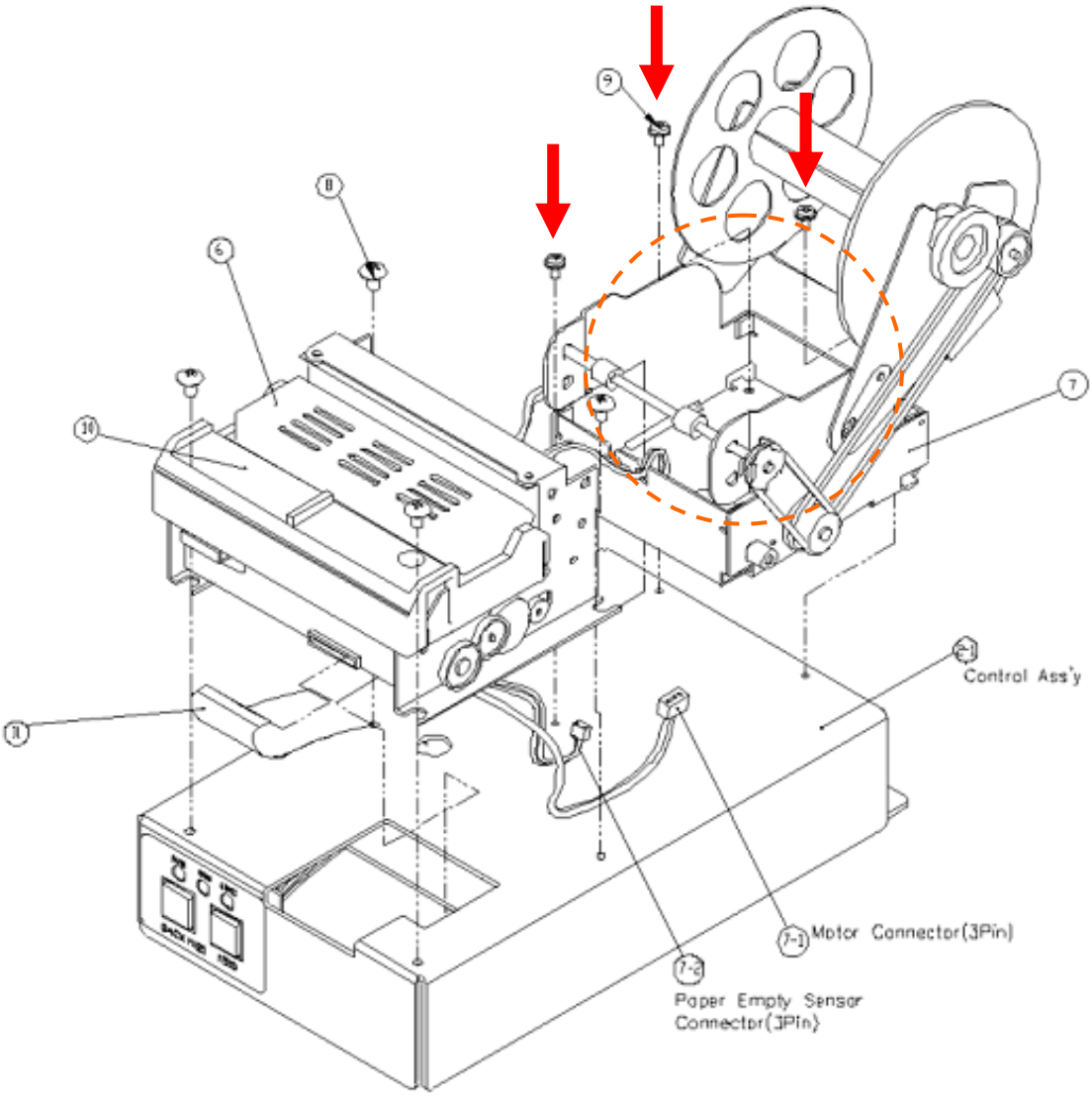



- Un-Screwing ⑧M4 (X4 EA)
- Take out DOT Printing Header ⑥ from Unit.

**PRODUCTION INFORM :**

Please Keep out each screws disassembled, Screws have to be used for reassemble.

No more lower level of disassemble is permitted for DOT Header.

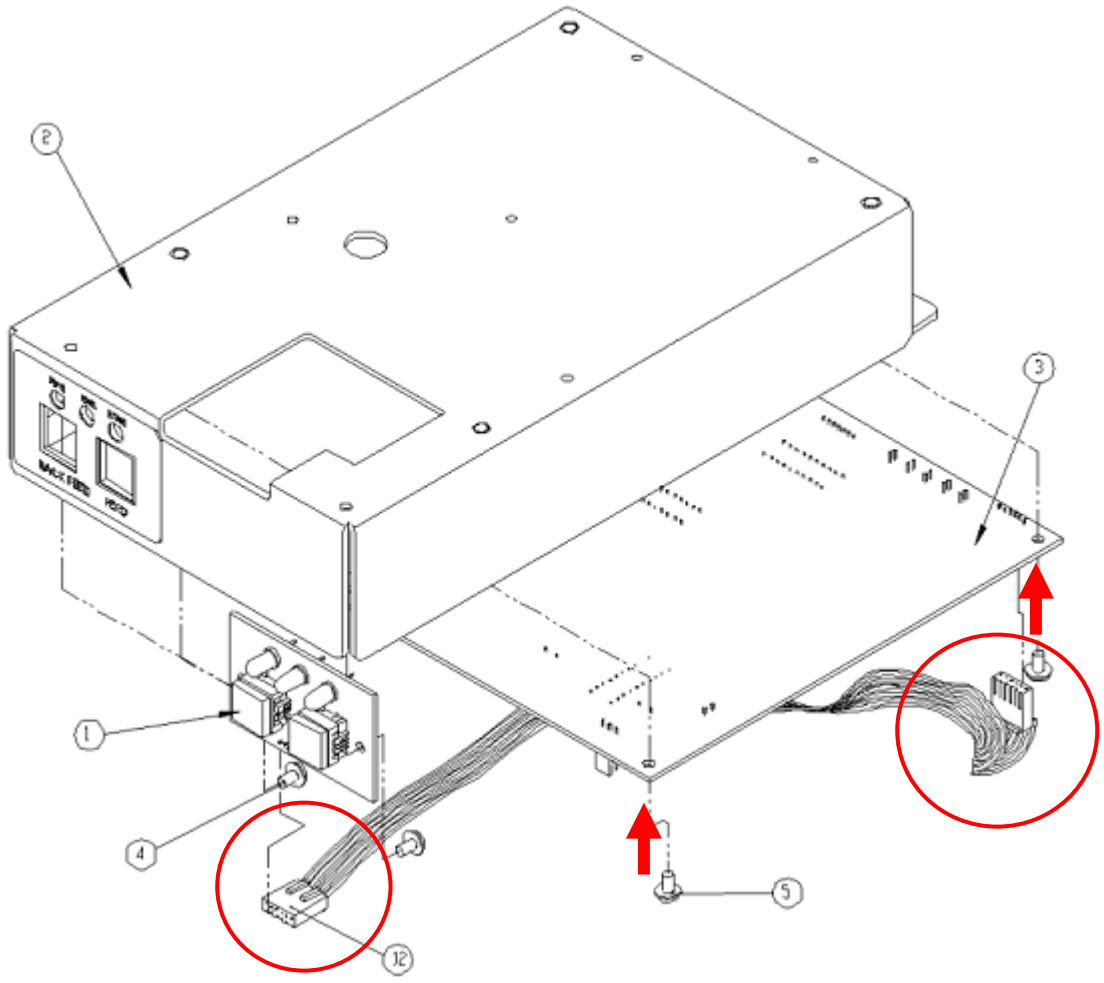



- Un-Screwing ⑨M3 (X3 EA)
- Take out Winder Module ⑦ from Unit.

**PRODUCTION INFORM :**

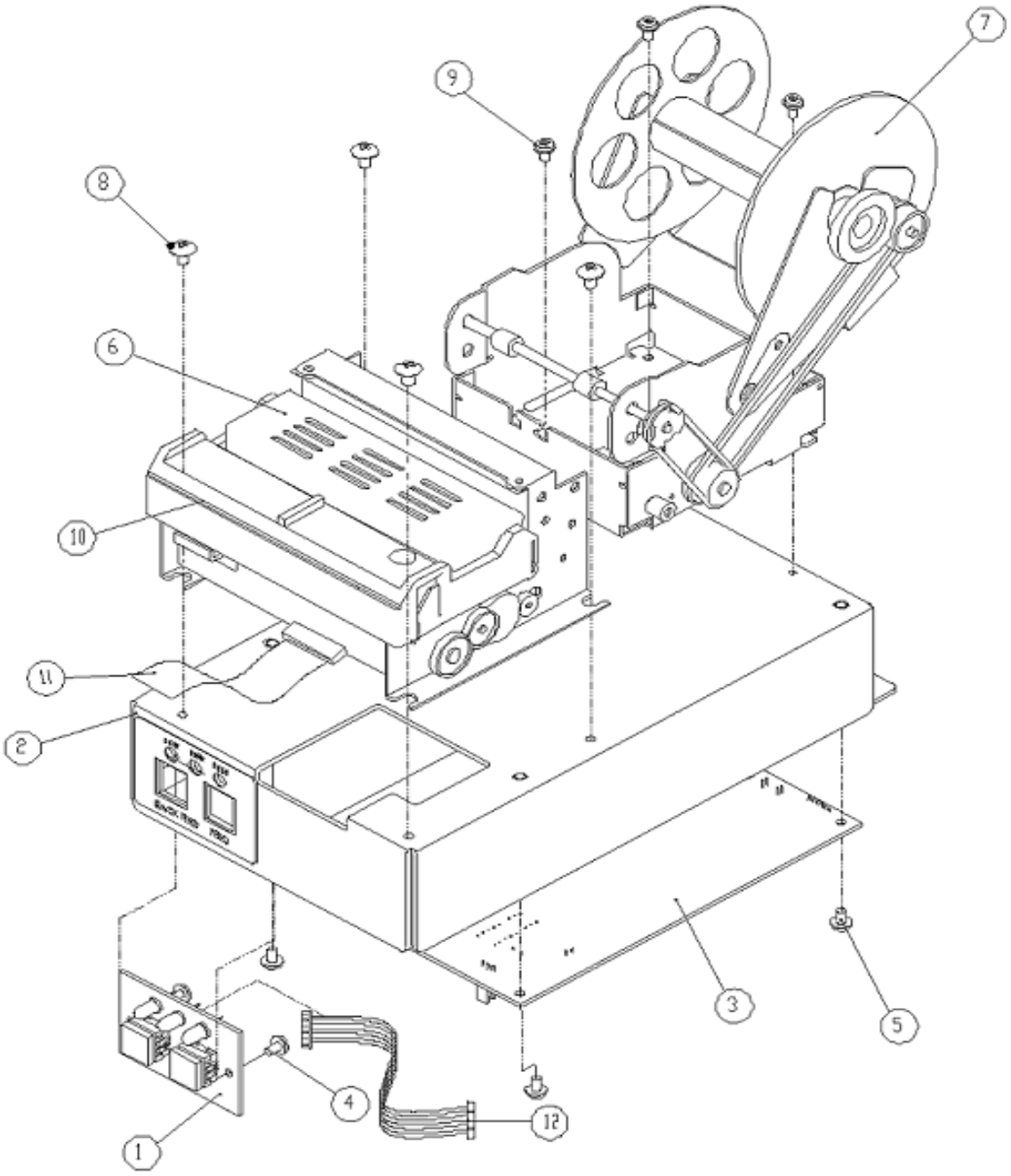
Winder has 2 Types of Power belt

If you need to exchange this, remind that belt direction and it's position either..



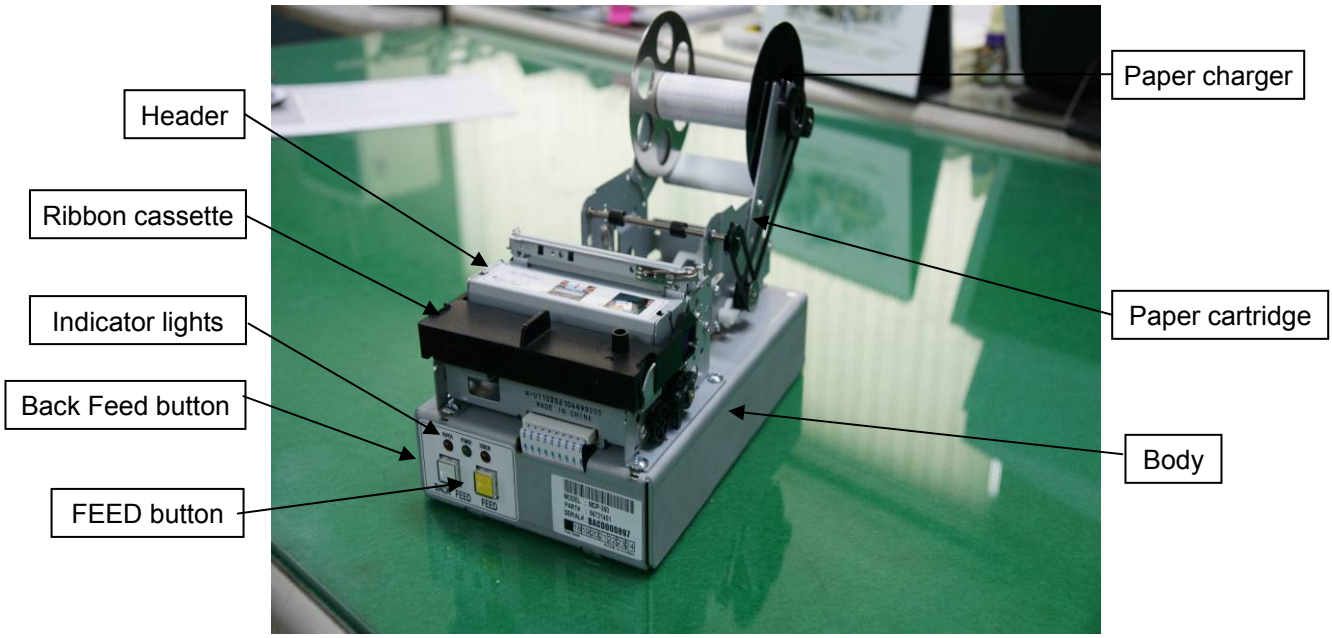

- To Take out Printer Main Board, first disconnecting Switch cables ⑫
- Un-Screwing M3 ⑤ X 4EA and takeout main board carefully from Printer Case Box ②
- Un-Screwing M3 ④ X 2EA and takeout Key Button board from Printer Case Box ②

### *Exploded View*

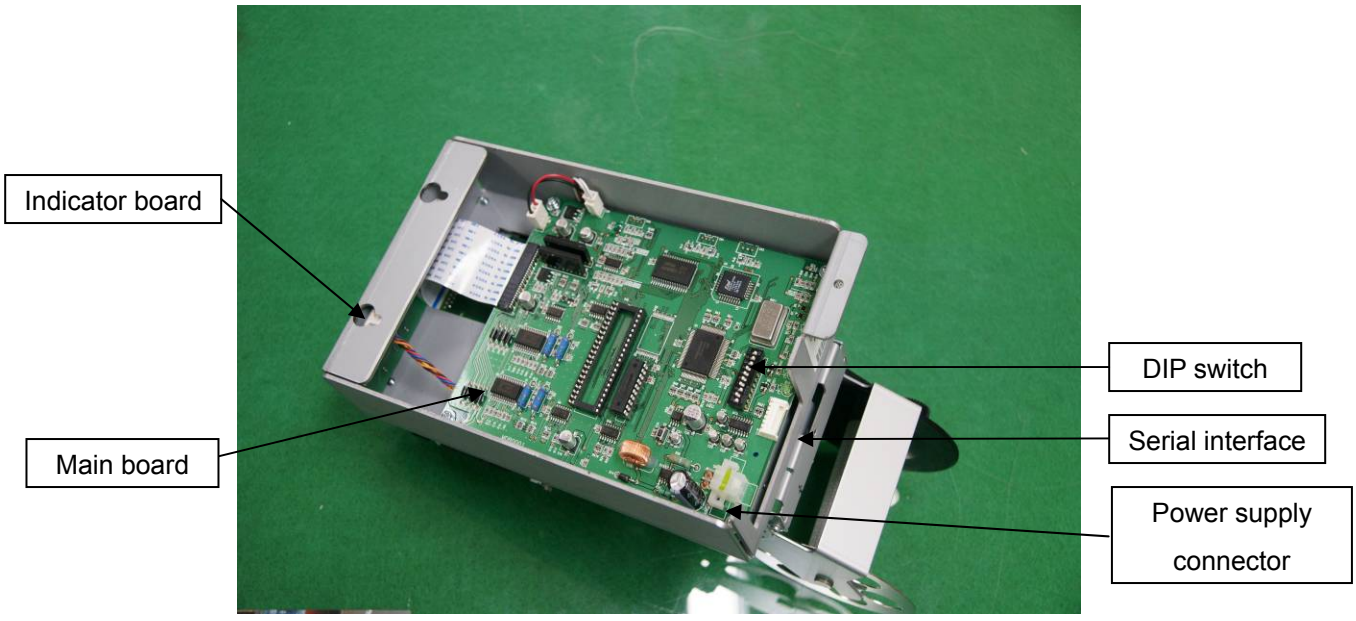


### 12.1.3 Setting up the printer

***External appearance and parts names***

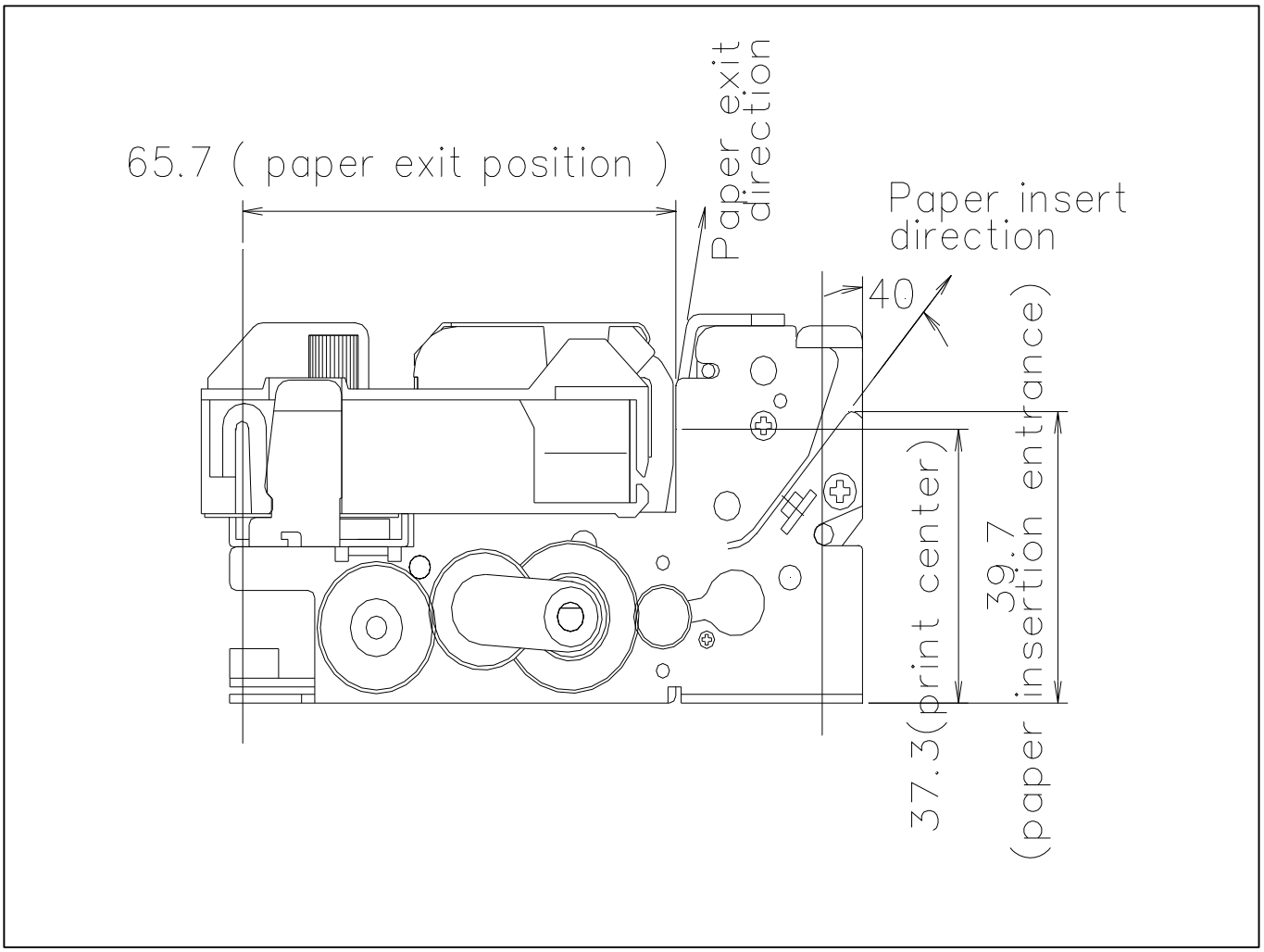



**Front face**




**Back face**

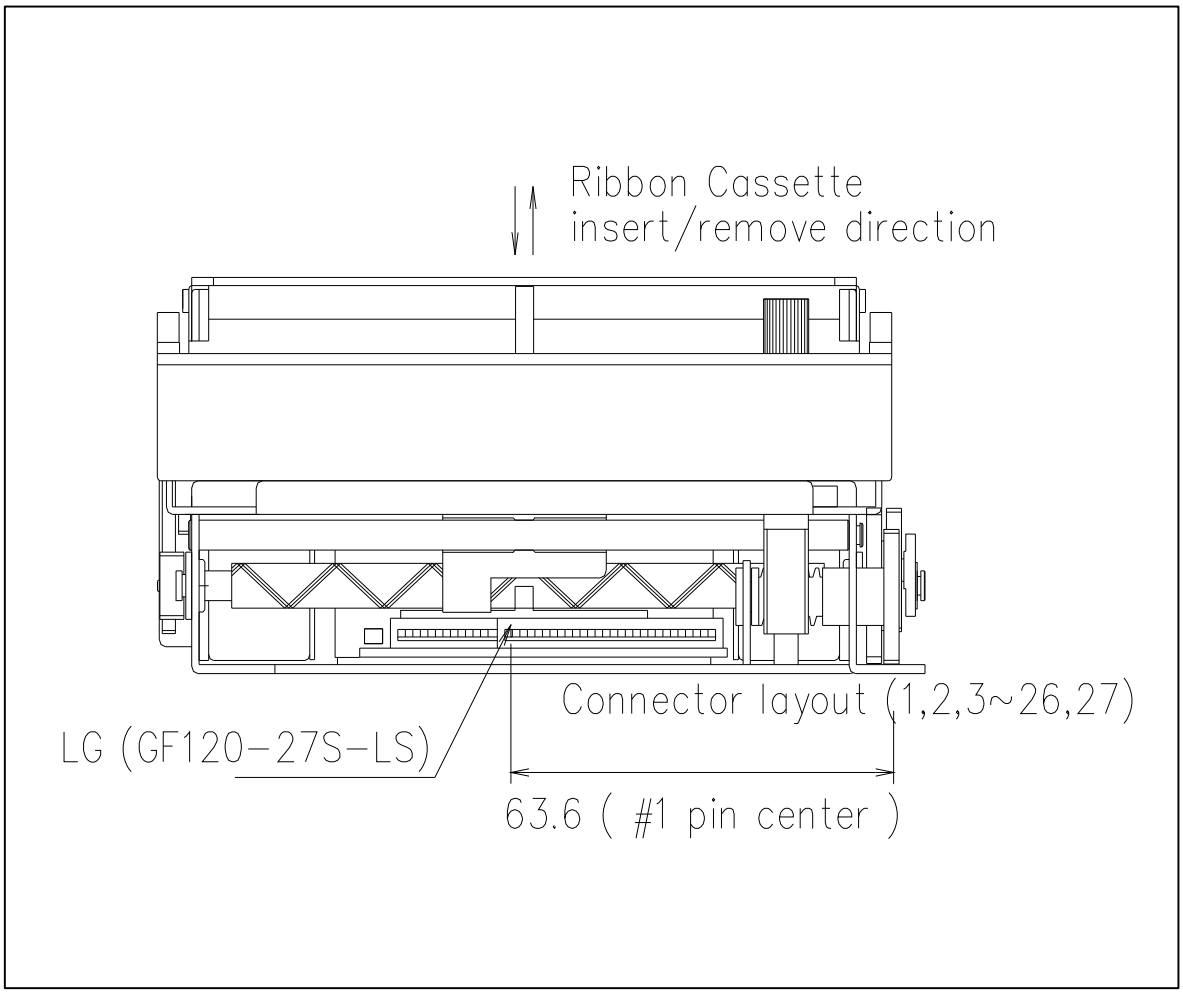
### *Paper Setting*




Using regular paper for Printer is required.

When Paper detection sensor detects the paper from paper path, Line feed motor will loading paper 150mm out through the paper exit direction. Please refer to operator manual for detailed explanation.

### *Ribbon Install*




Ribbon Cassette is posited on the DOT Header and fastened by side guider hole.
To take out Ribbon, grip side guider carefully and pick it up.

Ribbon Installation: grip both side of ribbon cartridge and put the Ribbon into Side Guider hole.
You need to turn the lever on Ribbon clock wise to make Ink Ribbon tighten.

## Installing the Ribbon Cassette

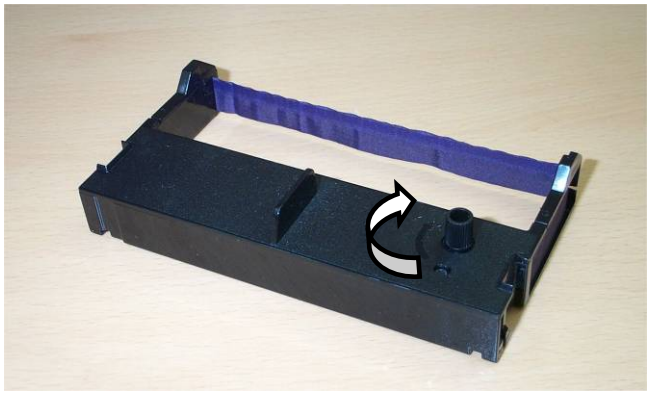
♣ ***CAUTIONS:***

Never turn the ribbon cassette's feed knob in the opposite direction of the arrow marked on the cassette; otherwise the ribbon cassette may be damaged.

Be sure the printer is not receiving data when you replace a ribbon cassette; otherwise, data may be lots.

***Note:*** *Use the SAJ-011 cassette for your printer.*

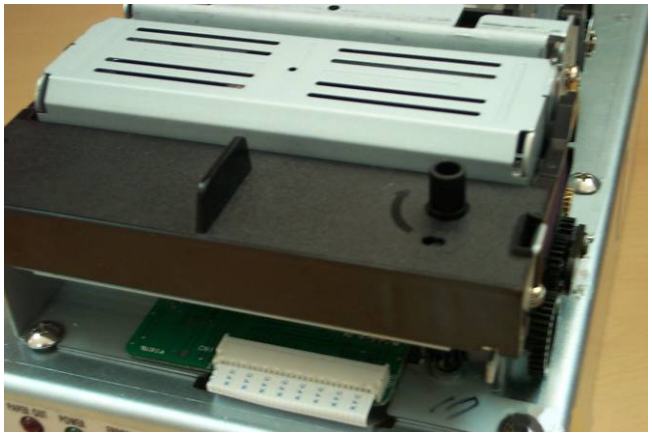
1. Turn the ribbon cassette's knob in the direction of the arrow to take up any slack in the ribbon.



**Direction to turn the ribbon cassette's knob**

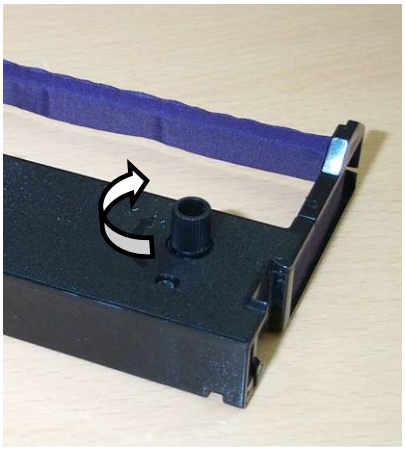
2. Insert the ribbon in the position and push the ribbon cassette until it clicks.

***Note:*** *Make sure that the ribbon is installed between the printer head and the platen wrinkles or crease.*



**Insert the ribbon in the position**

3.Turn the ribbon cassette's knob 5 or 6 times in the direction of the arrow again to take in the ribbon.



**Turn the ribbon cassette's knob**

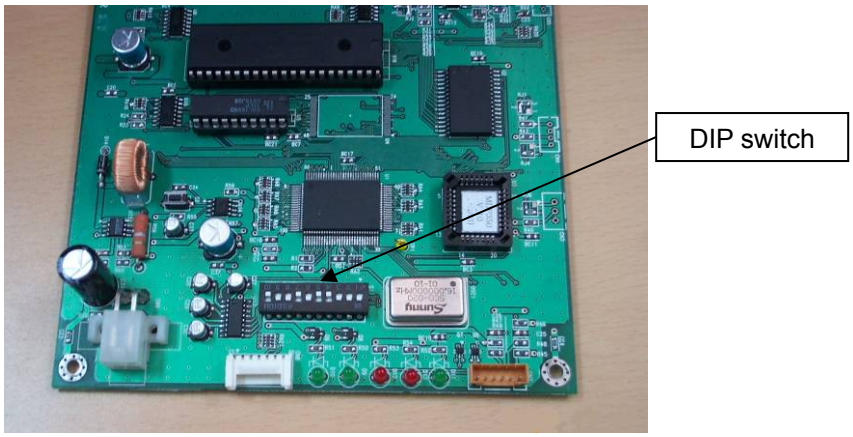
### *Setting the DIP Switches*

♣ ***CAUTION:***

Turn off the printer while setting the DIP switch to prevent an electrical short, which can damage the printer.

You can change your serial interface and print column settings by changing the DIP switch settings.

1. Make sure that the printer is off.
2. Turn the printer over and remove the DIP switch access as shown below.




**DIP switch**

3. There are one set of switches. Notice that on ON is marked each set of switches. Use tweezers of another narrow tool to move the switches.
4. Use the following tables to set the DIP switches.

**Model with Serial Interface DIP-Switch Functions**

| Switch No. | Function | ON | OFF |
|---|---|---|---|
| 1 | Data reception error | Ignored | Prints "?" |
| 2 | CR character | CR + LF | CR only |
| 3 | Handshaking | XON/XOFF | DTR/DSR |
| 4 | Word length | 7 bit | 8 bit |
| 5 | Parity check | Yes | No |
| 6 | Parity selection | Even | Odd |
| 7 | OFF OFF: 4800 bps; OFF ON: 9600 bps | ON OFF: 19200 bps | ON ON: 38400 bps |
| 8 | | | |
| 9 | Selects number of characters per line (CPL) 7 x 9 font / 9 x 9 font | 46 CPL / 38 CPL | 42 CPL / 35 CPL |
| 10 | Korean and Chinese printing font | four pass | three pass |

### 12.1.4 Using the Printer

#### *Operating the Control Panel*

You can feed paper with the FEED button on the control panel and also you can change direction on the feeding. The indicator lights help you monitor the printer's status.

**Button**

**1. FEED button :**

Press the FEED button once to advance roll paper one line. You can also hold down FEED button to feed the paper continuously.

This button is also used while replacing the paper roll. The PAPER OUT light blinks and printer enters the on-line recovery standby state after paper loading. When the PAPER OUT light blinks, press the FEED button to set the printer on line.

***Note:*** *This button can be disabled by the ESC 2 and ESC 3 command.*

**2. Back Feed button**

Press the Back Feed button once to change direction on the feeding.

This button is also used while replacing the paper roll. The PAPER OUT light blinks and printer enters the on-line recovery standby state after paper loading. When the PAPER OUT light blinks, press the Back Feed button to set the printer on line.

Indicator lights

The control panel lights provide information on printer conditions.

(1) Power supply (POWER) LED: Green

ON : Power supply is stable.

OFF : Power supply is not stable.

(2) Paper roll near-end (PAPER OUT) LED: Red

ON : Near-end or end of paper roll is detected. (*1)

OFF: Adequate paper remains on the paper roll (normal condition).

Blinking : Waiting for recovers to on-line status after automatic paper feeding. Or when select dump switch for paper reverse feeding. (See section 3.5, paper out processing)

(3) Error (ERROR) LED: Red

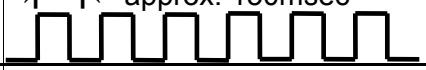
ON:Off-line (except during paper feeding using the FEED button and during the self-test).

Blinking: Error state.

OFF : Normal operation.

<Paper Out Processing>

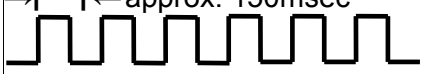
**Paper Out LED blinking time**

| Status | Description | PAPER OUT LED blinking pattern | Remark |
|---|---|---|---|
| Waiting for recovery | Waiting for recovers to on-line status after automatic paper feeding | →\| \|←approx. 150msec  | Reference **GS z** |
| Paper reverse feeding | When select dump switch for paper reverse feeding | →\| \|←approx. 450msec  | Dump button |

<Error Processing>

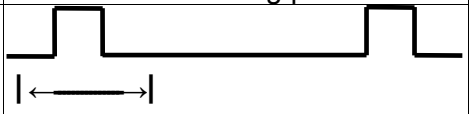
1) Error that is automatically recovered

**Automatically Recoverable Error**

| Error | Description | ERROR LED blinking pattern | Recovery |
|---|---|---|---|
| Print head temperature error | Print head temperature is extremely high | →\| \|←approx. 150msec  | Automatically recovers when the print head temperature falls |

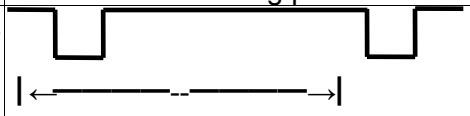
2) Errors that may be recovered via commands

**Command-recoverable Errors**

| Error | Description | ERROR LED blinking pattern | Recovery |
|---|---|---|---|
| Home position detection error (mechanical error) | Home position cannot be detected due to a paper jam or other problem |  \|←——→\| Approx. 1650msec | Recovers using **DLE ENQ 2** |

3) Errors that cannot be recovered

**Unrecoverable Errors**

| Error | Description | ERROR LED blinking pattern | Recovery |
|---|---|---|---|
| Print head temperature detection circuit error | Abnormality in the mechanism or circuit connection. Or abnormality in the print head temperature |  Approx. 1650msec | Impossible to recover |

***Note**: If an error that cannot be recovered occurs, turn off the power as soon as possible.*

### 12.1.5 Troubleshooting

#### *General problems*

**The lights on the control panel do not come on.**

Make sure that the power supply cables are correctly plugged into the printer, the power unit, and to the power outlet. Make sure that power is supplied to the power outlet. If the outlet is controlled by a switch or timer, use another outlet.

#### *Printing problems*

**The ERROR light is blinking and the printer does not print.**

First, turn off the printer and check for a paper jam.

If there is no paper jam and the printer has been printing for quite a while, the print head may be overheated. If the print head is overheated, the printer will resume printing when the head has cooled(usually within four or five minutes).

If there is no paper jam and the print head is not overheated, turn off the printer and turn it back on after about 10 seconds. If the printer still does not work, unplug the power supply cord from the outlet immediately. Then contact a qualified service person.

**The ERROR light is off, but nothing is printed.**

Try to run the self test to check that the printer works properly. See the self test instructions in Chapter 4 of operator manual to run the self test. If the self test does not work, contact your dealer or a qualified service person.

If the self test works properly, check the following:

1. Check the connection at both ends of the interface cable between the printer and the computer. Also make sure that this cable meets the specifications for both the printer and the computer.

2. The data transmission settings may be different between the printer and computer. Make sure that the printer's DIP switch settings for data transmission are the same as the computer's. You can print the printer's interface settings using the self test.

If the printer still does not print, contact your dealer or a qualified service person.

**The printer sounds like it is printing, but nothing is printed.**

The ribbon cassette may not be installed properly.

The ribbon may be worn out. Replace the ribbon cassette.

**The printout is faint.**

The ribbon may be worn out. Replace the ribbon cassette.

**A line of dots is missing in the printout.**

The print head may be damaged. Stop printing and contact your dealer or a qualified service person.

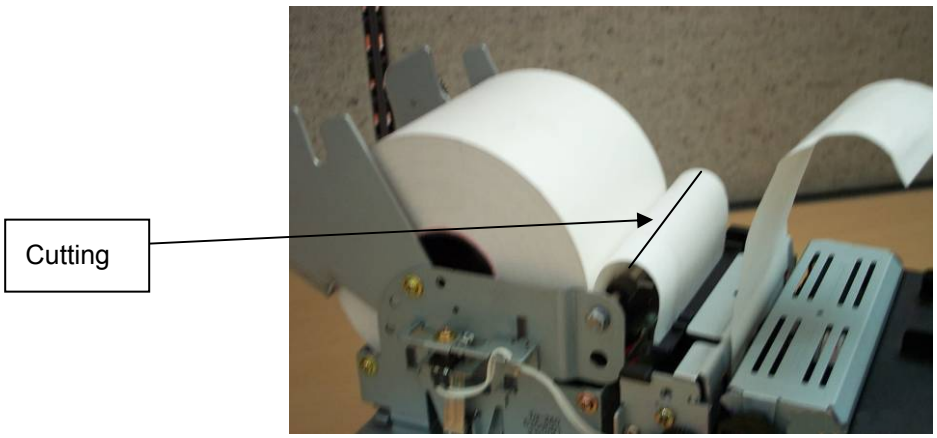
### *Clear Jam*

One of simple idea to clear Jam is preceding reverse sequence as paper loading.
After cutting off the paper between Paper winder and Paper insertion direction, take out paper to paper insert direction.

♣ ***CAUTION:***

The print head becomes very hot during printing. Allow it to cool before you reach into the printer.

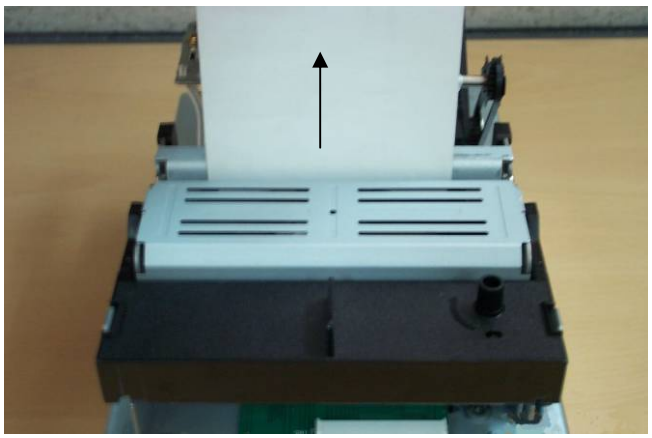
1. Pull up the paper and cut the paper at the dotted line shown in the illustration below.




**Cut the paper**

2. Remove the paper roll from the printer.
3. Remove the jammed paper by pulling it in the direction of paper feeding.

***Note:*** *Do not pull the jammed paper in the opposite direction of paper feeding.*

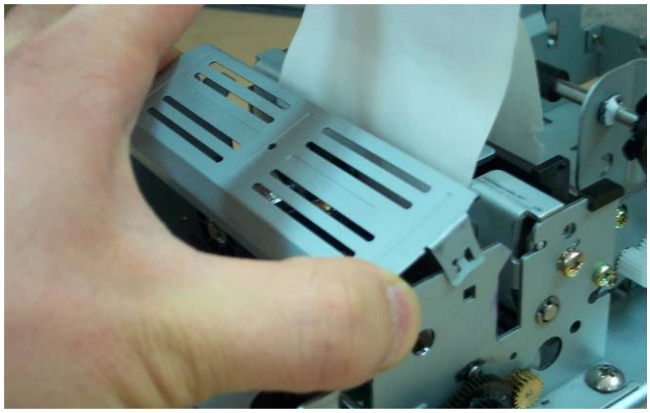


**Pull up the paper**

4. If paper still remains in the printer, follow the steps below.
5. Remove the ribbon cassette.
6. Loosen the clip securing the print head cover. Open the clip only until you can tilt it as shown in the illustration.

***Note:*** *Do not remove the screw from the print head cover.*

7. Lift up the print head cover.



**Lift up the print head cover**

8. Remove all the jammed paper.

***Note:*** *Do not pull the jammed paper in the opposite direction of paper feeding.*

9. Replace the print head cover and secure it with the screw.

10. Replace the ribbon cassette and close the auto cutter.

11. Replace the paper roll.

## 12.2 T-JPR

This printer receives the command from the host, or main control unit, and prints the information that the customers want.

### 12.2.1 Specifications

#### Printing Specifications

| Item | Specifications |
|---|---|
| Printing Method | Thermal printing |
| Font Configuration | Alpha numeric(95), graphics(128), international character(32)<br>Font Download |
| Print Speed | Max: 200mm/sec, Typ: 170mm/sec |
| Resolutions | 200dpi(8dots/mm) |
| Print Width | 80mm |
| Print Head Life | 100km |
| Power | 24VDC ± 5%, 6A |
| Dimensions | 167(W) x 350(D) x 230(H) |
| Weight | About 3 kg (without paper roll) |

#### Roll Paper Specifications

| Item | Specifications |
|---|---|
| Paper Type | Thermal Paper |
| Paper Width | 80mm |
| Roll Diameter | Max. 150㎜ |
| Thickness | Single : 0.05㎜ to 0.10㎜ |
| Print Area | 80mm |
| Roll Core | Use Only Roll Paper That is not Glued to the Core |

## Interface Specifications

| Item | Specifications |
|---|---|
| Data transmission | RS-232C (serial) |
| | USB |
| Synchronization | Asynchronous |
| Handshaking | XON / XOFF control |
| Signal levels | Mark = -3 to -15V ... logic '1'/OFF |
| | SPACE = +3 to +15V ...logic '0'/ON |
| Baud rate | 4800, 9600, 19200, 38400 BPS |
| Data word length | 8 bit |
| Parity | None parity |
| Stop bits | 1 bit |
| Connector | SMAW200-07P |
| | 5268-03 (MOLEX) |
| | USB TYPE B |

## Journal Specifications

| Item | Specifications |
|---|---|
| Journal Width | 84㎜ |
| Journal Diameter | ø160㎜ |
| Journal Core | ø40㎜ |

## Reliability Specification

| Item | Specifications |
|---|---|
| Operating environment | 5℃ ~ 45℃ (temperature)<br>10 ~ 80%RH, at 40℃, no condensation (relative humidity) |
| Storage environment | -20℃ ~ +60℃ (temperature)<br>5 ~ 95%RH, at 40℃, no condensation (relative humidity) |

## 12.2.2 Configuration and operation of the journal printer

### Configuration

| Printing Section |
| --- |
| - Thermal Printer Module |
| - Auto Feeding |
| - Cutter Manual |

| Frame Section |
| --- |
| - Base Ass'y |
| - Winder Bracket Assembly |

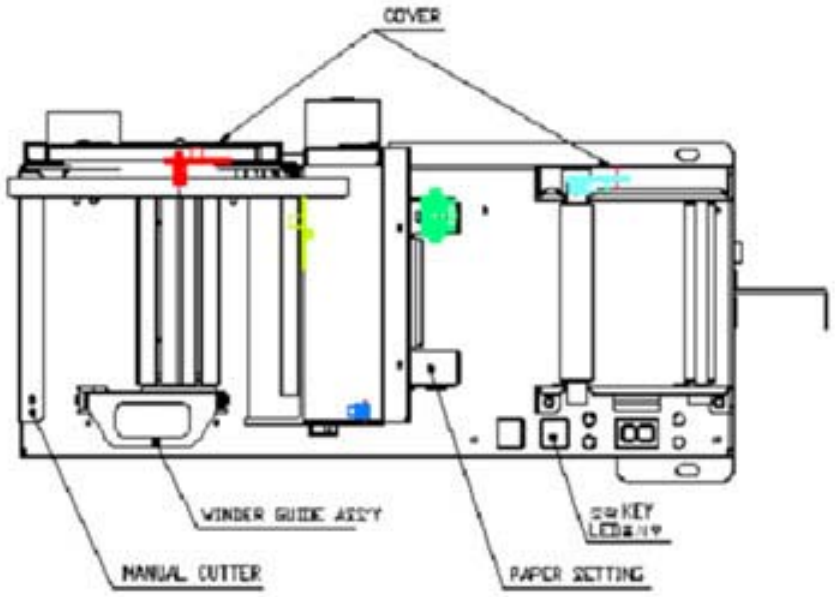
| Operation Section |
| --- |
| - Feed Key |
| - Back Feed Key |
| - LED Display Section |
| - 7 Segment Display |
| - Dip Switch |

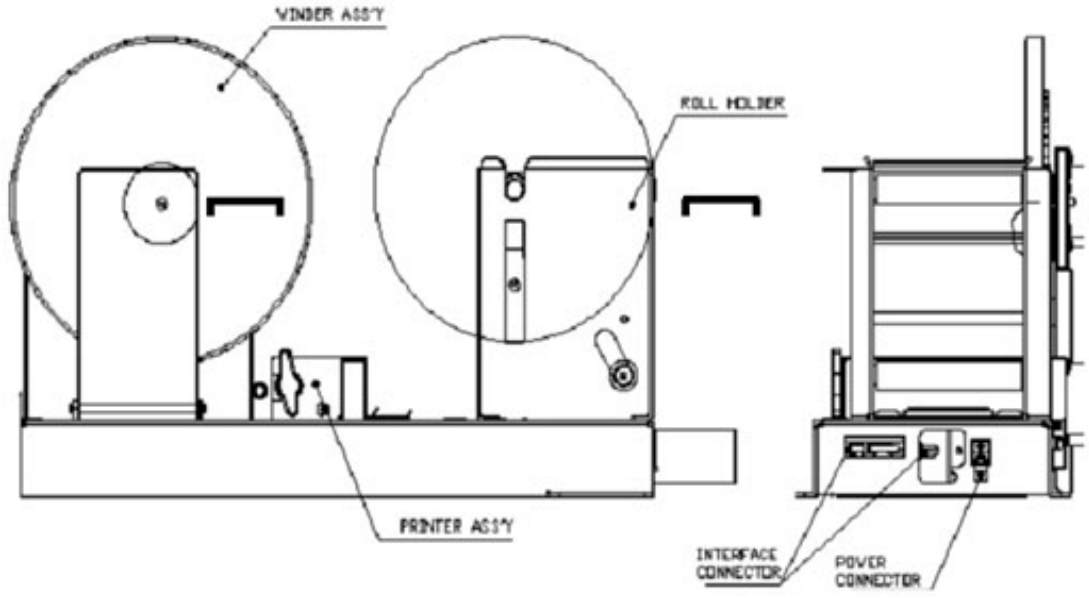
| Rewinder & Roll Box Section |
| --- |
| - Winder Assembly |
| - Roll Paper Collection Section |
| - Paper Residual Sensor Assembly |

| Electric Outfitting Section |
| --- |
| - Main Board Assembly |

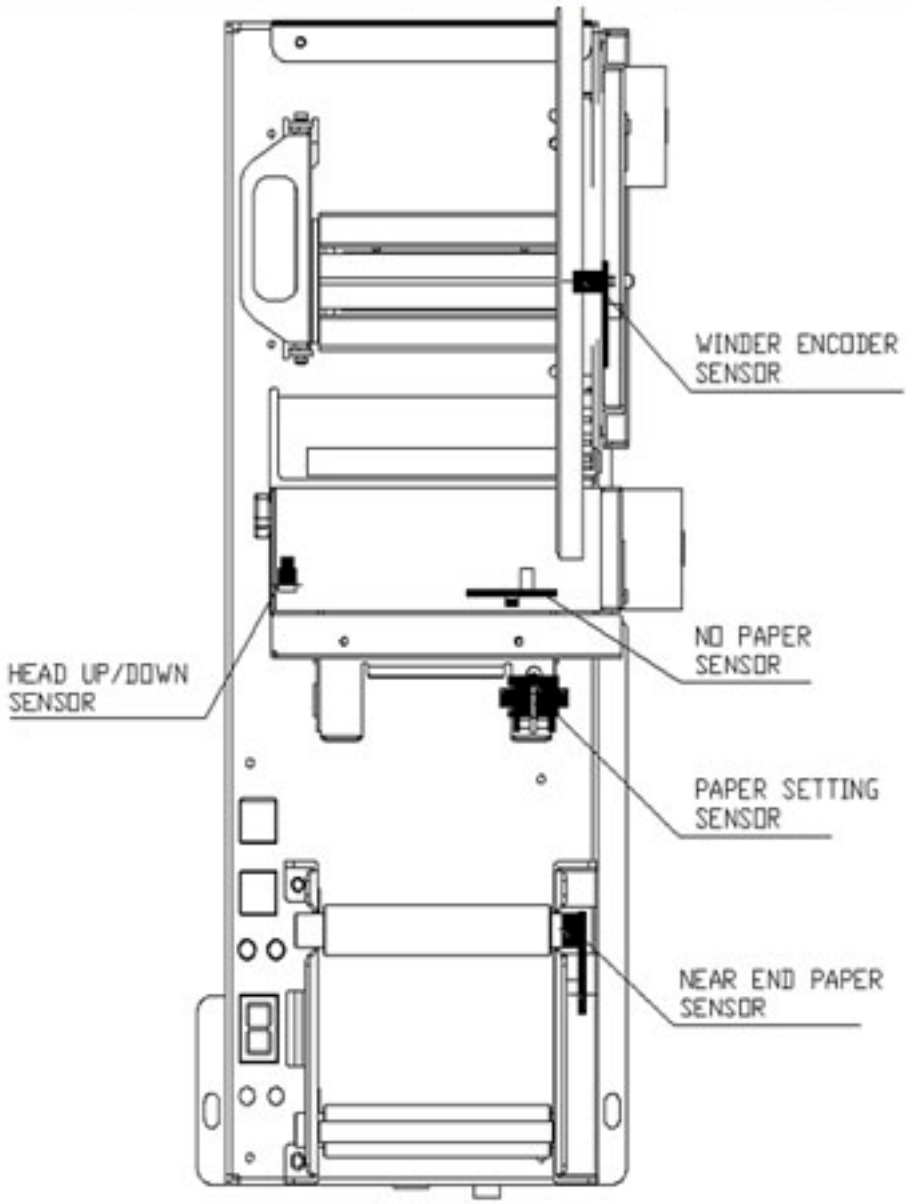
| Cover Section |
| --- |
| - Winder Cover |
| - Roll Box Cover |

**Outside view of the journal printer**

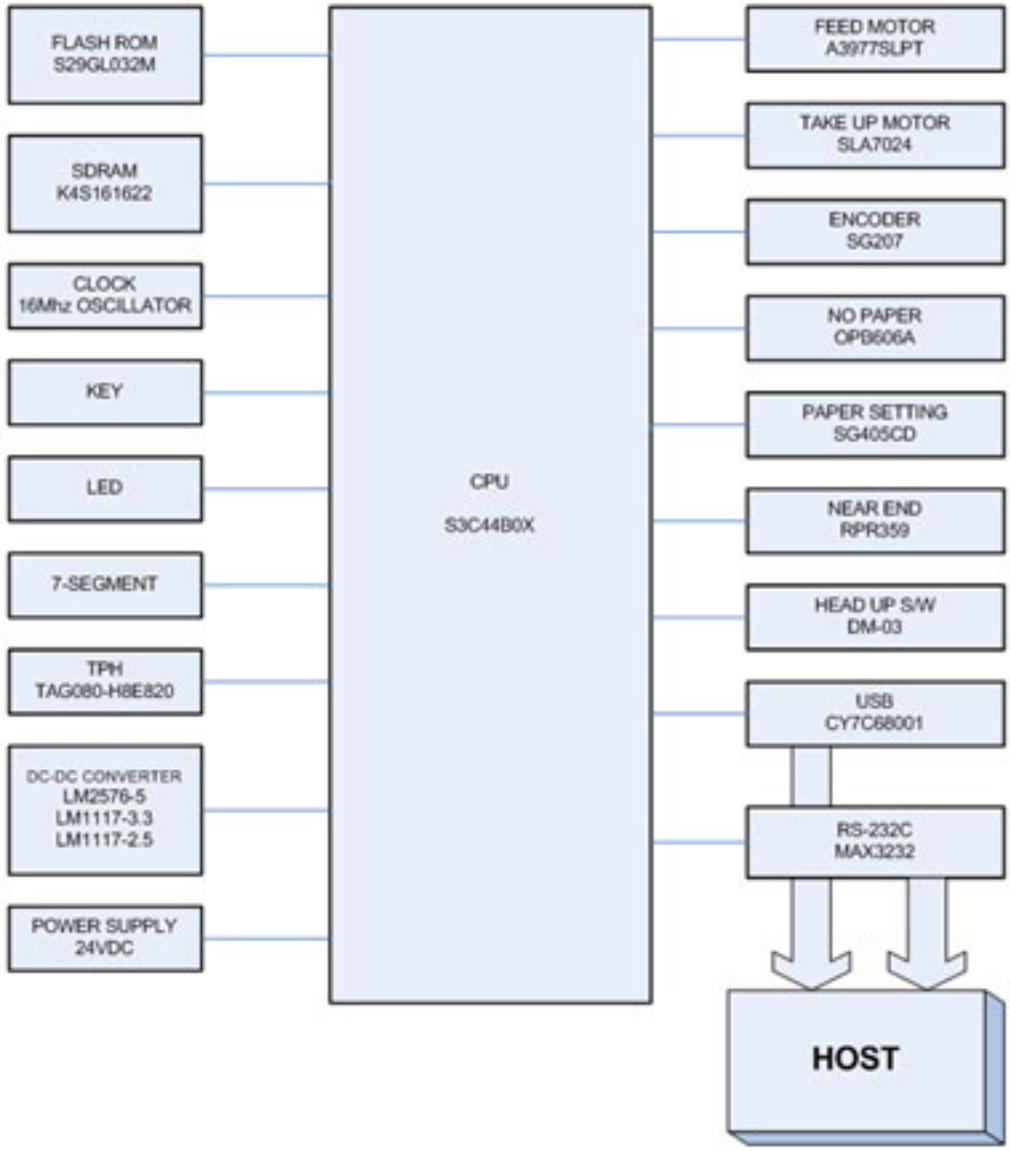


## Sensor Layout

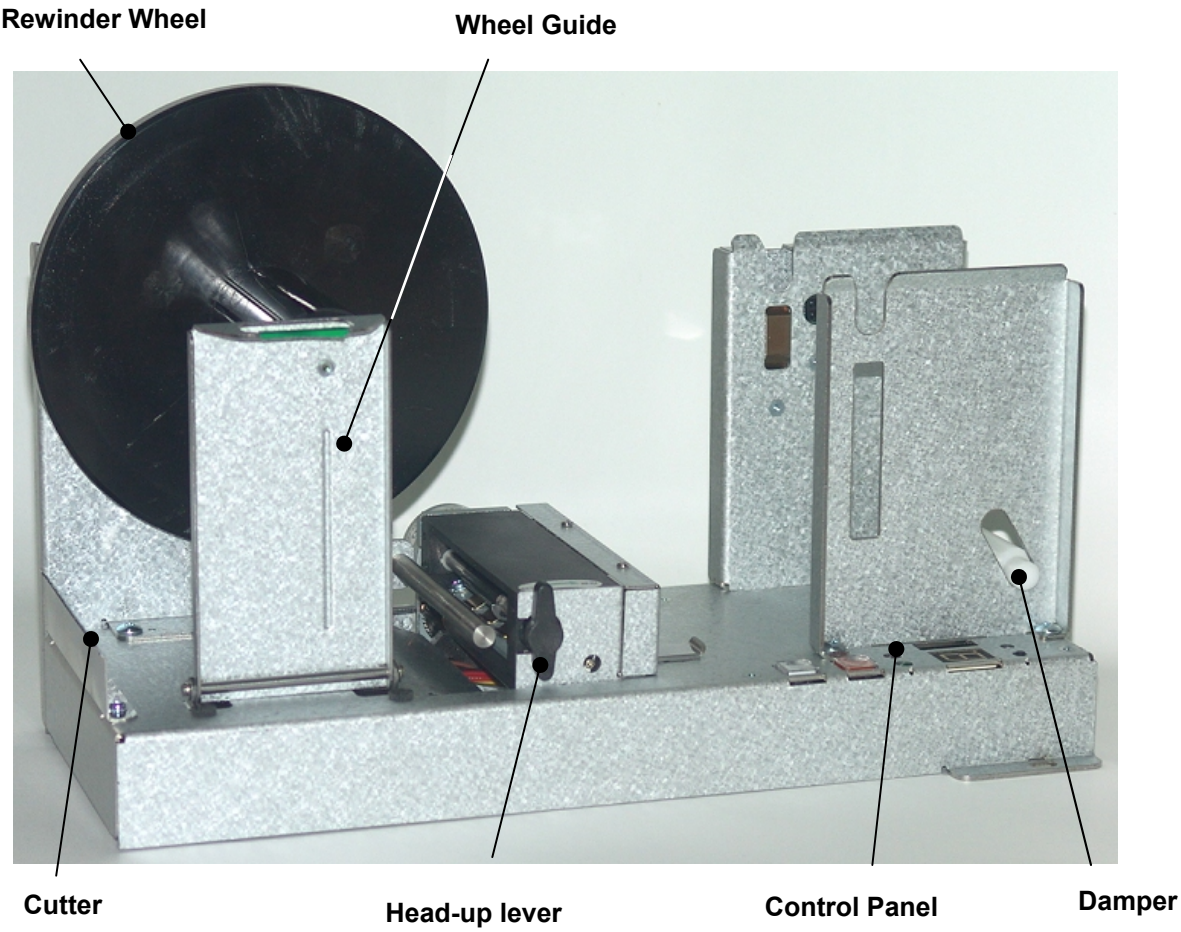


## System Block Diagram

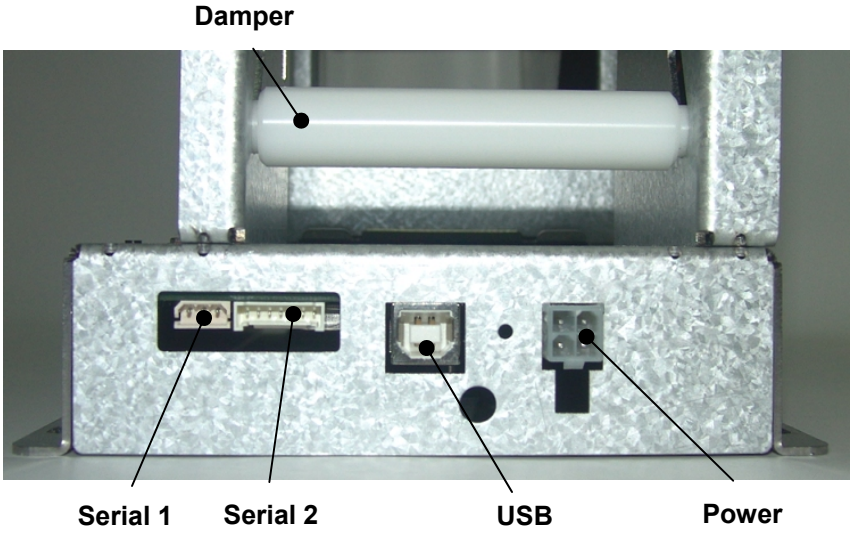


## Component name and location

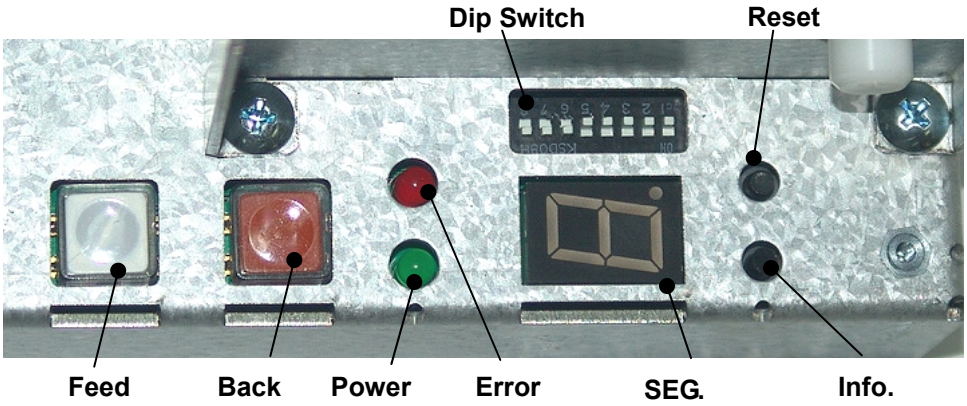
1) Front section



2) Rear section




3) Control Panel




- Feed Button : Feed the paper at a certain length and wind it on the rewinder section.
- Back Button : Turn the rewinder wheel conversely and unwind the wrapped paper.
- Info. Button : Print out the version and status information of the printer.
- Reset Button : Reset the printer
- Power LED
  ① Blink : When the power is supplied.
  ② Off : When the power is off.
- Error LED
  ① ON : When the error is occurred on the printer.
  ② OFF : When the printer is normal.
  - SEG. : Display the status of the printer.

**Description of each part**

1) Memory
- Memory consists of 32Mbit FLASH ROM and 16Mbit SRAM.
- FLASH ROM is the section of $00000000_{16}$~$01BFFFFF_{16}$.
- SDRAM is the section of $0C000000_{16}$~$0DFFFFFF_{16}$.

2) DIP SWITCH
- Input as CPU GPC0~7.

3) Sensor
- Remove the first noise component by RC low-pass filter configuration.
- Check the signal of all sensors by A/D converter of CPU.
- No paper sensor detects the paper and loads it automatically.
- Paper Setting sensor detects the existence or nonexistence of the paper.
- Winder Encoder sensor detects the drive status of Take up unit.
- Near end sensor detects the residual of the roll paper.

4) RS-232C COMMUNICATION
- Serial communication with the host by RS-232C.
- Use the signals of TXD, RXD, CTS and RTS by CN1 connector.
- Use the signals of TXD and RXD by CN17 connector.

5) USB COMMUNICATION
- Serial communication with the host by USB 2.0 Port.

6) LED
- Control Error LED and Power LED by Transistor.

7) SEGMENT
- Control the segment in the section of CPU 0200000016~0400000016 by 74HCT273.

8) Paper Feed Motor
- Paper feed motor is the bipolar stepping motor and control by PWM current control driver.

9) Take Up Motor

- Take up motor is the unipolar stepping motor and control by PWM current control driver.

10) TPH

- Use CMOS TTL(74HCT244) and transfer the data reliably.
- Confirm the stable drive of TPH by controlling 24V power.

11) POWER

- Convert 24VDC into 5VDC and supply it to 5V logic circuit.
- Convert 5VDC into 3.3VDC and supply it to 3.3V logic circuit.
- Convert 5VDC into 2.5VDC and supply the output power of CPU and AD sensor.

12) Frame section

- Consist of main base, winder bracket assembly, and so on.
- Each frame uses the cold rolled steel (t=1.6$^{mm}$) and screwed up by M4 screw using Guide Indenting.

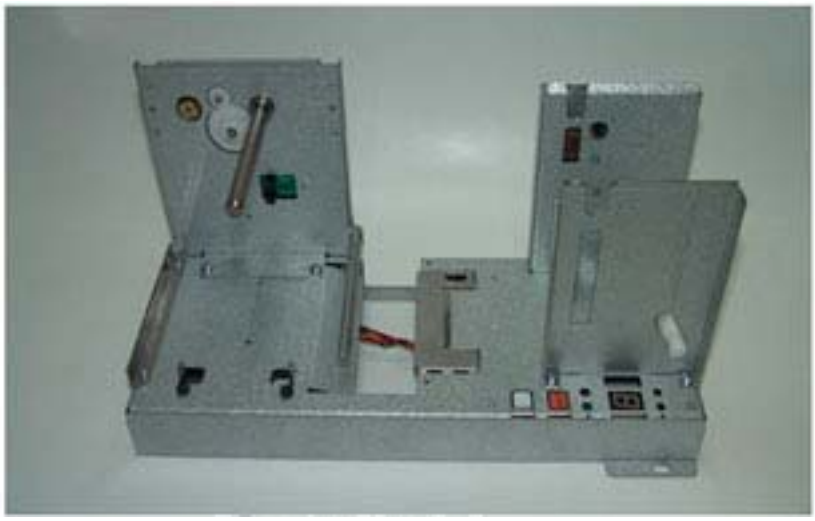


Fig. 12.1 Frame Section

13) Cover

- Cover consists of winder bracker cover, roll box cover, and so on to protect the harness.
- Each cover uses the thin cold rolled steel (t=1.0 ㎜,1.0 ㎜,1.2 ㎜), guide indenting and M3 screw.

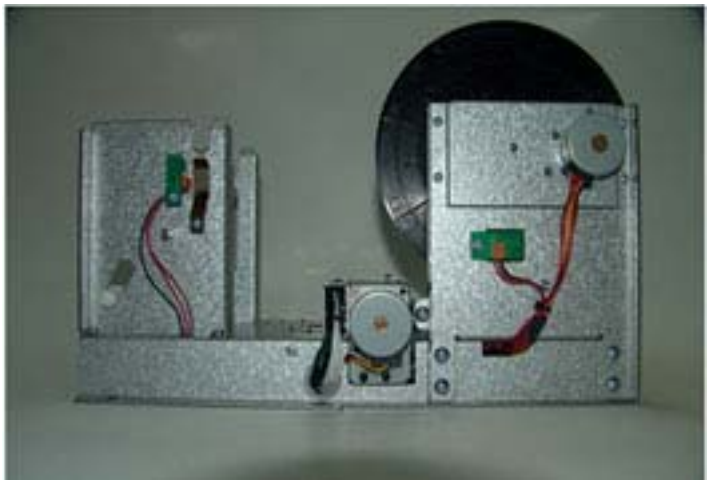


Fig. 12.2 Cover

14) Operation section

- Consists of feed, back feed key, LED display part and DIP switch.
- Display the paper transfer, power ON/OFF, error, and so on.
- Feed and back feed key use the mechanical switch and the signal is inputted when users press the switch. This unit is located inside of the main base frame and is mounted at the bottom of the main board.
- LED Display Section
  → Power : Display the power (DC,+24V) ON/OFF status
  → Existence or nonexistence of the paper : Display the existence or nonexistence of the printer paper setting.
  → Paper shortage : When the residual of the paper is 10%. (modifiable)
  → Rewinder error : When the rewinder section doesn't drive.
- DIP Switch Section

DIP SWITCH SETTING

| No | Function | On | Off |
|---|---|---|---|
| 1 | Emulation mode | T1 | T-JPR |
| 2 | Data reception error | Prints "?" | Ignored |
| 3 | CR + LF character | CR + LF | CR only |
| 4 | Historical Control | ON | OFF |

| No | Printing Density | 5 | 6 |
|---|---|---|---|
| 5 6 | Level 1 | Off | Off |
| | Level 2 | Off | On |
| | Level 3 | On | Off |
| | Level 4 | On | On |

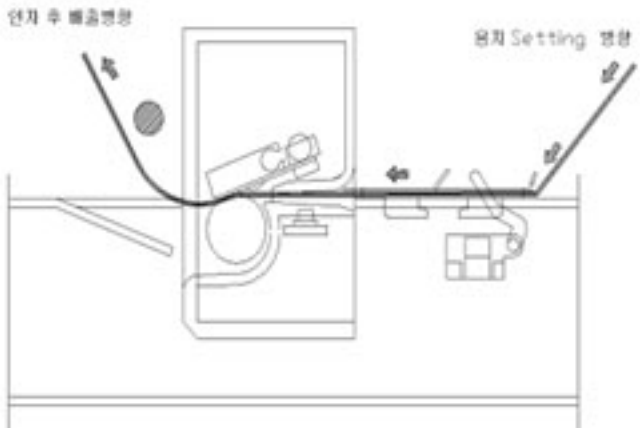
| No | Baud rate | 7 | 8 |
|---|---|---|---|
| 7 8 | 4800 bps | Off | Off |
| | 9600 bps | Off | On |
| | 19200 bps | On | Off |
| | 38400 bps | On | On |



Fig.12.3 Operation section

15) Printing Section

- Printing section consists of paper setting guide and thermal printer module.
- Print out by Max 200mm/sec.
- Set the paper automatically and transfer it to the printing location. Then the thermal head applies heat to the thermal paper. The printed paper is dispensed as shown in below picture.



12.4 Printing section

16) Rewinder Section

- Rewinder section consists of rewinder and detection sensor.
- Rewind the printed paper by 50mm/sec.

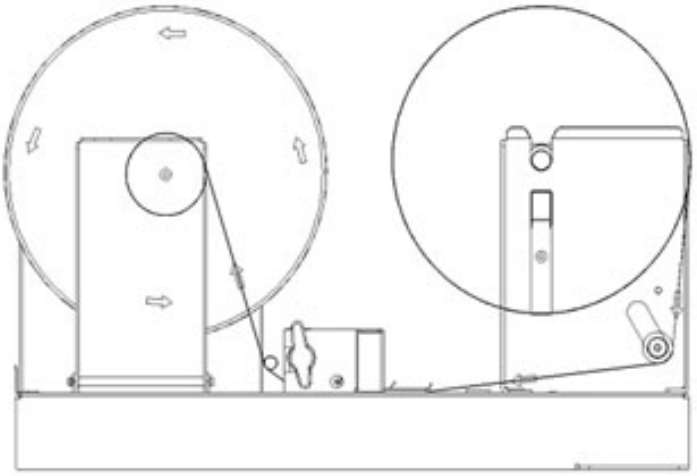


Fig.12. 5 Rewinder section

17) Roll Box Section

- Roll box section consists of the roll paper collection box and residual detection sensor assembly.
- The residual detection sensor is variable by the user.

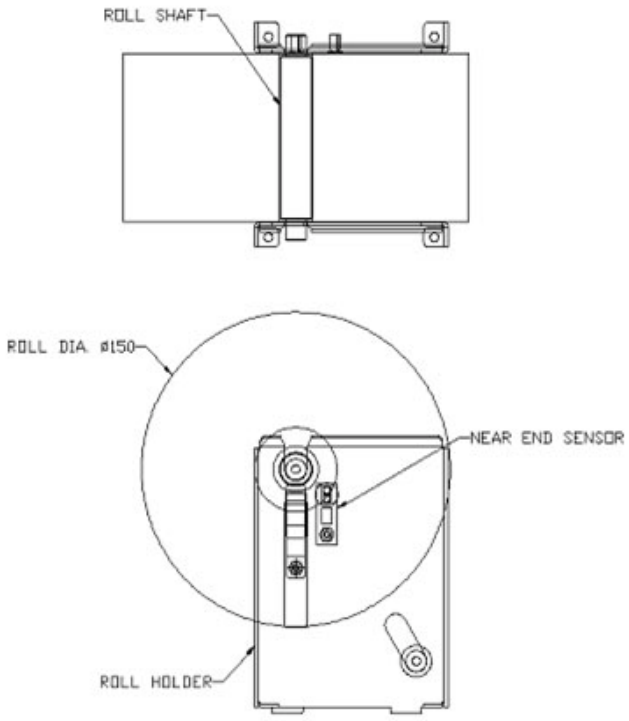



Fig.12.6 Roll box section

18) Electric Outfitting Section

- Electric outfitting section consists of main board and operation section mounted on the main board.
- Transfer the signal needed to drive the journal printer.

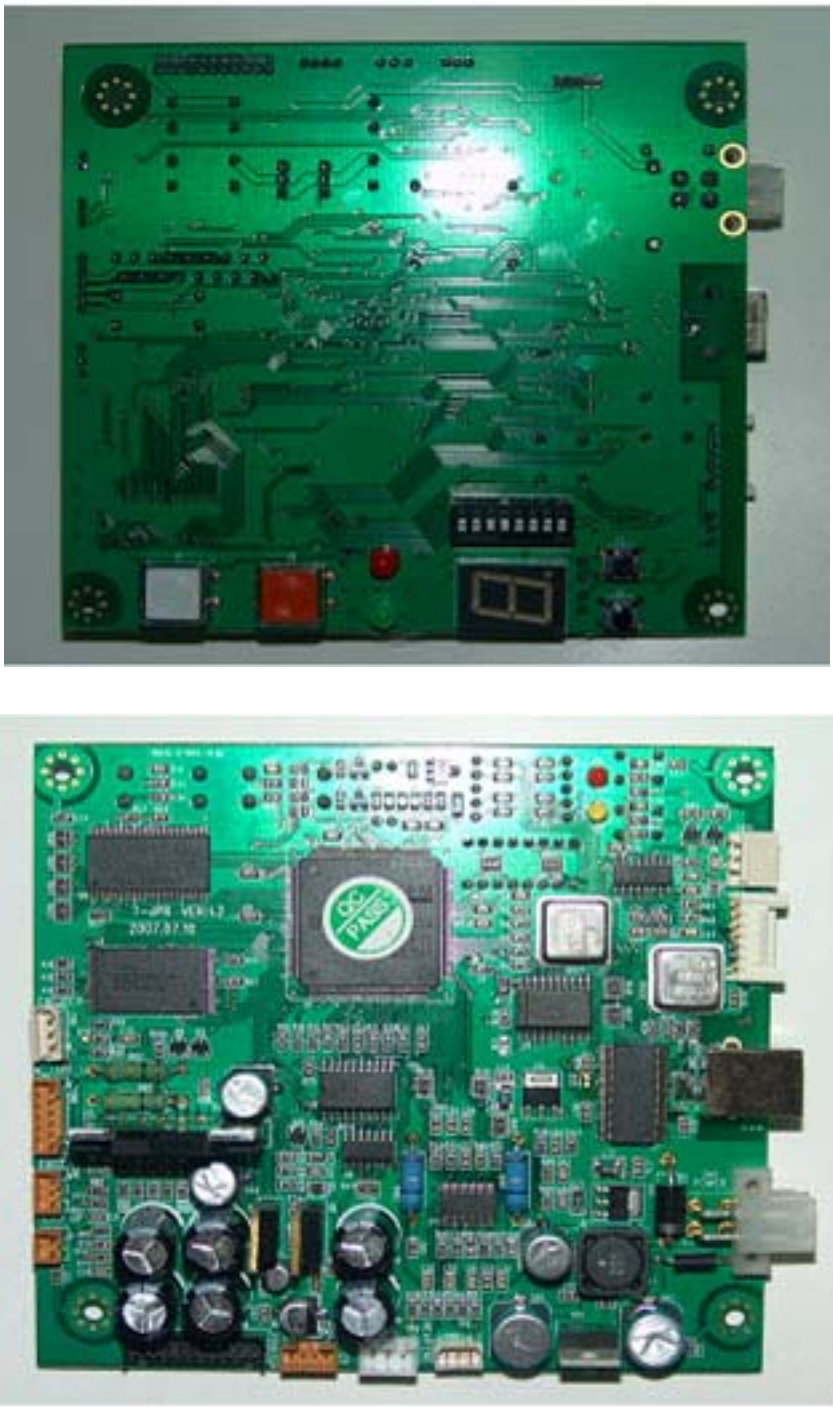


Fig. 12.7 Main Board

### 12.2.3 Journal printer installation

1) Connect the power and communication cable

- Turn off the power supply and connect the power and communication cable.

2) Dip Switch Setting

- Dip switch setting values are applied only for the first power supply, so it should be changed after turning off the power.

| No. | Function | On | Off |
|---|---|---|---|
| 1 | Emulation mode | T1 | T-JPR |
| 2 | Data reception error | Prints "?" | Ignored |
| 3 | CR + LF character | CR + LF | CR only |
| 4 | Historical Control | ON | OFF |
| No. | Printing Density | 5 | 6 |
| 5, 6 | Step 1 | Off | Off |
| | Step 2 | Off | On |
| | Step 3 | On | Off |
| | Step 4 | On | On |
| No. | Baud rate | 7 | 8 |
| 7, 8 | 4800 bps | Off | Off |
| | 9600 bps | Off | On |
| | 19200 bps | On | Off |
| | 38400 bps | On | On |

## 12.2.4 Error and troubleshooting

### Troubleshooting by the status of the error display section

| Indication | Name | Description | Troubleshooting |
|---|---|---|---|
| 0 | Normal Status | Normal Status | |
| 1 | No paper | The paper doesn't inserted into the printer. Or the paper runs out. | Mount the new paper. |
| 2 | | Sensor error, which detects the existence or nonexistence of the paper. | Take measures by inspection method of the sensor. |
| 3 | Printer Head open | Printer head open lever is opened. | Close the head open lever in the direction of the CLOSE. |
| | | Printer Head Open Switch Error | Take measures by inspection method of the sensor. |
| 5 | Printer Head Overheat | Printer Head is overheated by the long time printing. | Wait the temperature of the SET goes down sufficiently. |
| 6 | Near-end sensor error | When the residual of the paper is less than Ø30mm. | Mount the new paper. |
| | | Near-end Sensor Error | Take measures by inspection method of the sensor. |
| 7 | Rewinder Operation Error | Rewinder operates more than 7 but sensor values aren't changed. | Check whether the rewinder doesn't turn smoothly because of the excessive force. |
| | | Rewinder turns more than 10 but sensor values are changed continuously.. | Take measures by inspection method of the sensor. |
| 8 | CR code error | There is a data to be printed but the received command is the print completion, not print command (CR). | |

### How to check the error

| NO | Check Item | Description | Standard | How to check | Remarks |
|---|---|---|---|---|---|
| 1 | Status of the printer | Description of the printing | Dot should not be missed. | Check the status of the printing with the naked eyes. | If the module is bad, replace it. |
| | | Density of the printing | Printing density should be sufficient. | | |
| 2 | Sensor | Auto Setting | Check the LED lighting during the operation. | Check the printer operates normally. Or cause the error and check the status. | If the sensor is bad, replace it. (Refer to the standard of the assembly and adjustment.) |
| | | Rewinder Error | | | |
| | | Residual of the paper | | | |
| 3 | Paper Transfer | Clean the paper guide | Roll paper should pass through the guide section. | Check the roll paper is well dispensed through guide. | Remove the powder and dust with the brush. |
| 4 | Opeation PANEL | Lighting of the power LED | Light the LED during turning on the power. | Check LED lighting or blackout of the power ON/OFF. | |
| 5 | Rewinder | Paper-extracting | Drive the printer without paper-extracting. | Check the paper-extracting during drive. | |
| 6 | Exterior | Cleaning | A piece of paper or the dust should not be inside of the printer. | Check whether there is any dust or powder on the exterior or gap. | Wipe with the dry cloth or alcohol. |
| | | Lubrication | Oil should not be dried. | Check the rewinder or drive section operates well. | |
| | | Abnormal sound | Abnormal sound, smell or temperature rise should not be there. | Check whether the error occurs during operation. | |
| | | Abnormal smell | | | |
| | | Abnormal temperature rise | | | |
| 7 | Control Circuit | Clean and inspection of the printer | There should be no dust in the print substrate and should be no error in the pattern parts. | Clean with the air compressor and check whether there is any error in the pattern parts. | |
| | | Wiring, cleaning of the connector and inspection | Wiring damage, looseness of connector and the bad connection should not be there. | Check the wiring section with the naked eyes. | |

| NO | Check Item | Description | Standard | How to check | Remarks |
|---|---|---|---|---|---|
| 8 | Power | Measure the power | There should be the standard of the voltage for each section. | Measure each terminal with the multi-meter. | |
| 9 | General Operation | Operation Status | Seamless printing or rewind by the roll paper supply. | Check the paper is set and rewound smoothly. | |

## 12.2.5 Assembly Adjustment Standard

### Thermal Printer Module Disassembly

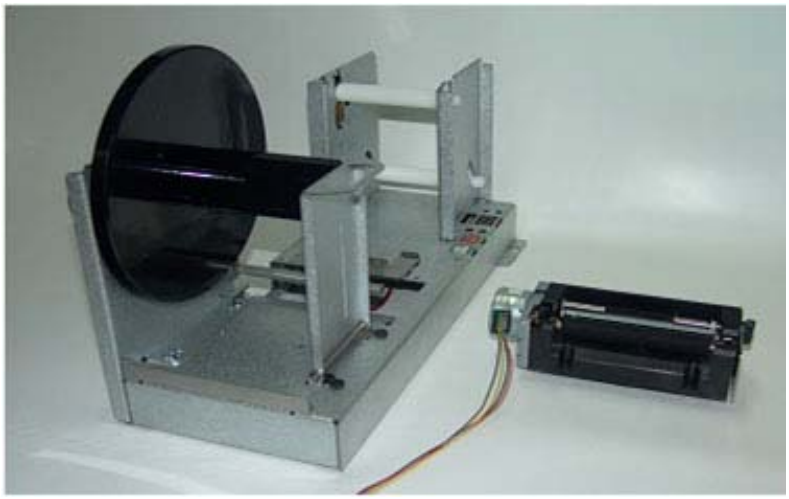
1) Remove the cover of the printer connector.



2) Disconnect each cable and remove 2 M3 screws for fixing thermal printer.



3) Disassemble the thermal printer from the main frame.



**Sensor Disassembly**

(Sensor detecting existence or nonexistence of the rewinder, residual of the paper and existence or nonexistence of the paper)

1) Remove rewinder cover and M3 screw. Then disassemble sensor.

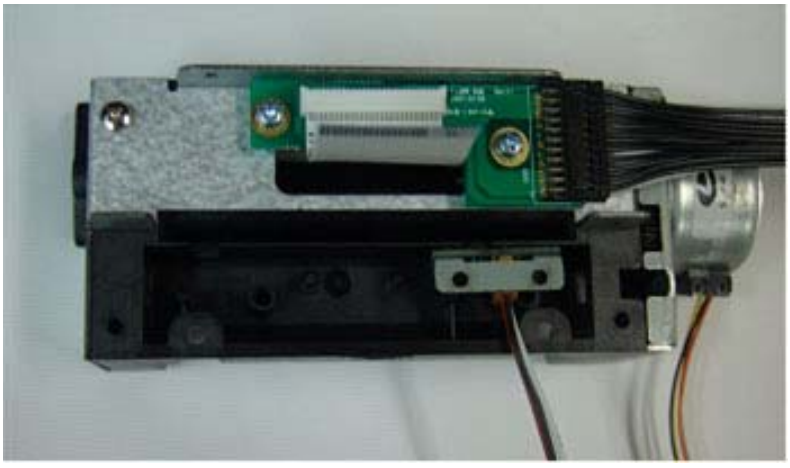


2) Remove roll box cover and M3 screw. Then disassemble the sensor detecting the residual of the paper.



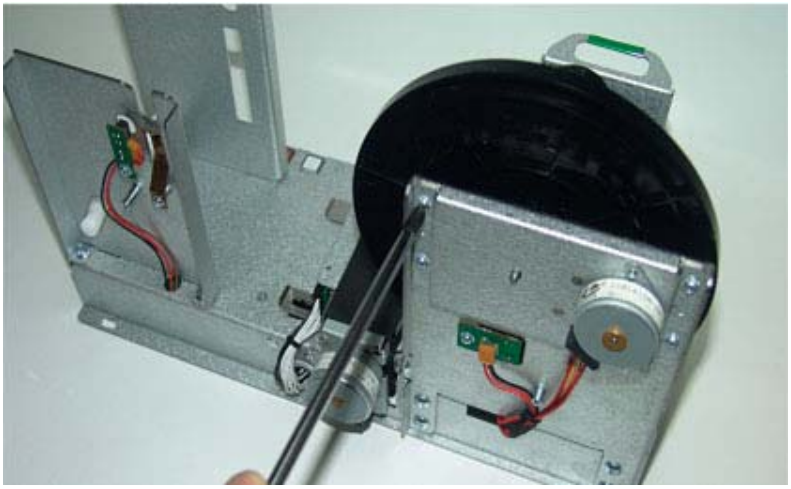
3) Disassemble sensor detecting the existence or nonexistence of the paper.

- Disassemble the printer module and then disassemble sensor.

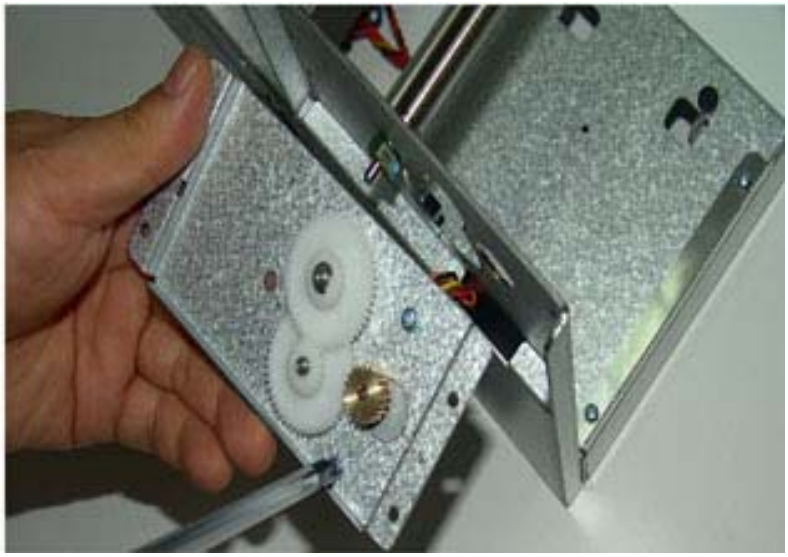


**Disassemble drive section of the rewinder**

1) Remove M3x5 screw for fixing motor bracket on the drive section of the rewinder.



2) Remove M3x5 screw and disassemble motor.

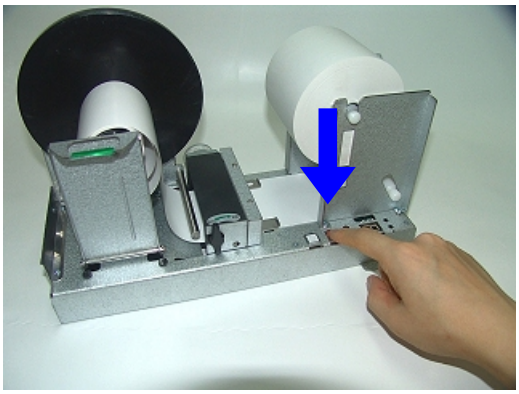


**Disassembly of the main board and key board**

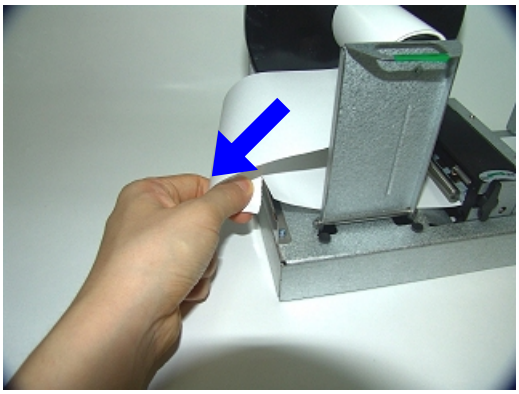


### 12.2.6 Remove the rolled paper from the rewinder.

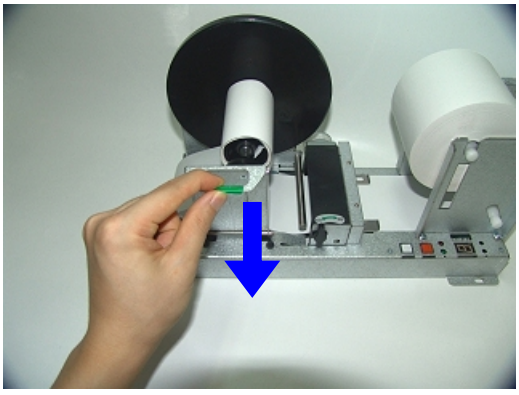
1) Press the BACK button and unroll the paper.



2) Cut the paper with the cutter. Be careful not to hurt the hand.



3) Open the rewinder wheel.



4) Removed the rolled paper.



# Chapter 13. Appendix

# 13.1 Consumables Specifications

## 13.1.1 Receipt Paper

This purchase specification applies to the receipt paper of L-SPR3

### Specification

Paper type: Thermal roll paper
Print color: Black

### Specification of the Receipt Paper

Paper type: Thermal roll paper
Print color: Black
Specification: Paper detects heat.
Paper basis weight : 55±3 g/㎡
Paper thickness : 58±4 ㎛

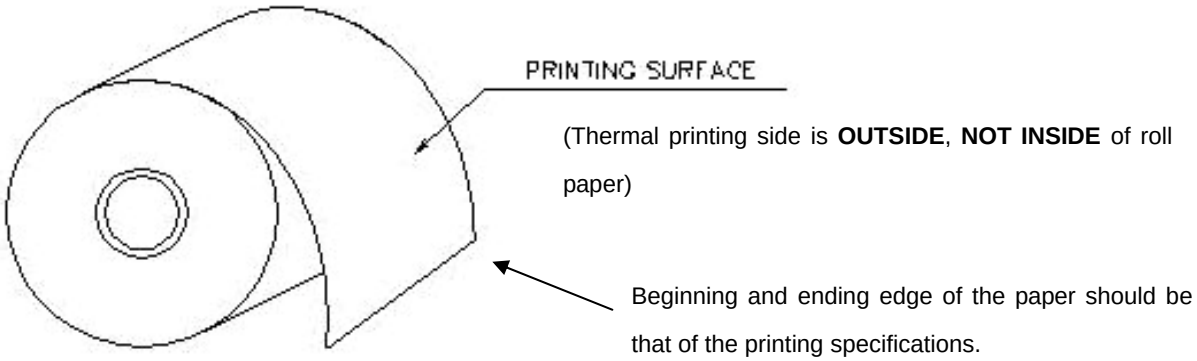

PRINTING SURFACE
(Thermal printing side is **OUTSIDE**, **NOT INSIDE** of roll paper)
Beginning and ending edge of the paper should be that of the printing specifications.

Fig. 13.1 Paper Specifications

## Roll appearance

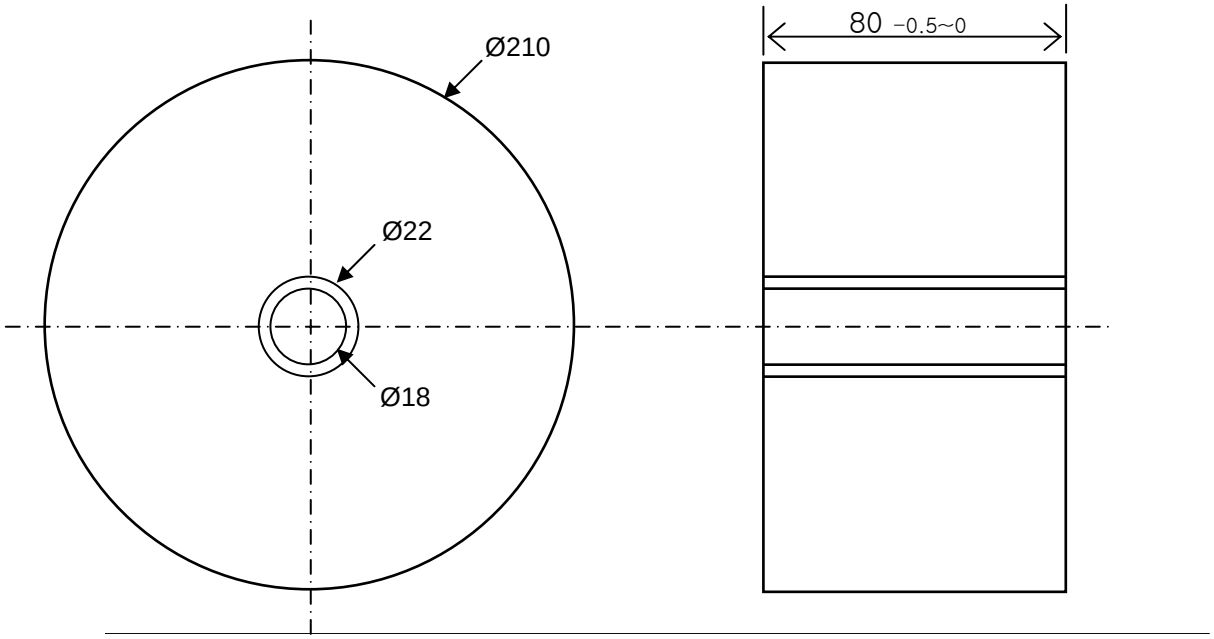



Fig.13. 2 External roll dimension

Note 1) Store the paper roll separately to prevent damage to the paper.

Note 2) Do not connect the papers with tape.

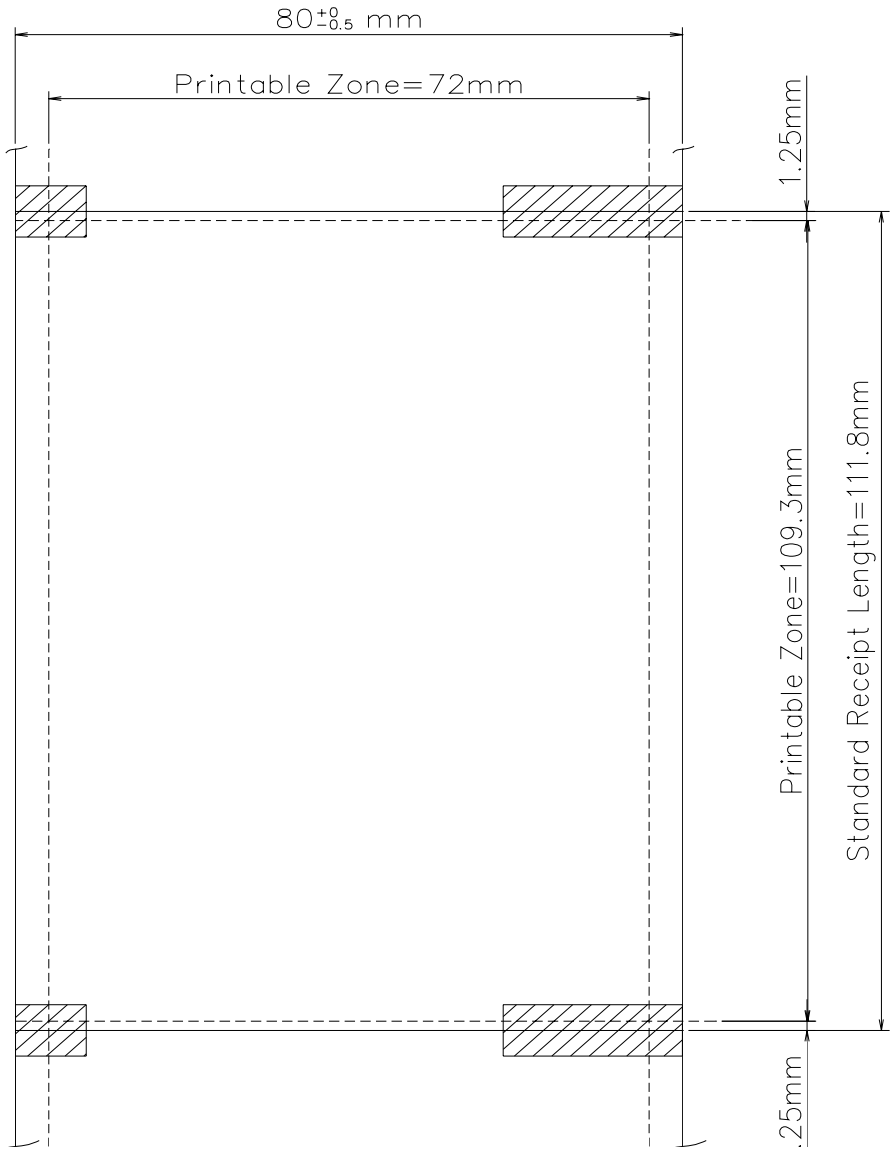
Note 3) Make sure the paper end is not attached to the paper pipe.

Note 4) Make sure the paper is rolled evenly.

## Printing and black mark position

### - Margins and printing area for one slip

Note 1) The vertical margin is 0.6 x 10 mm (0.02 x 0.4 inch).



-**Printing position of the black mark**

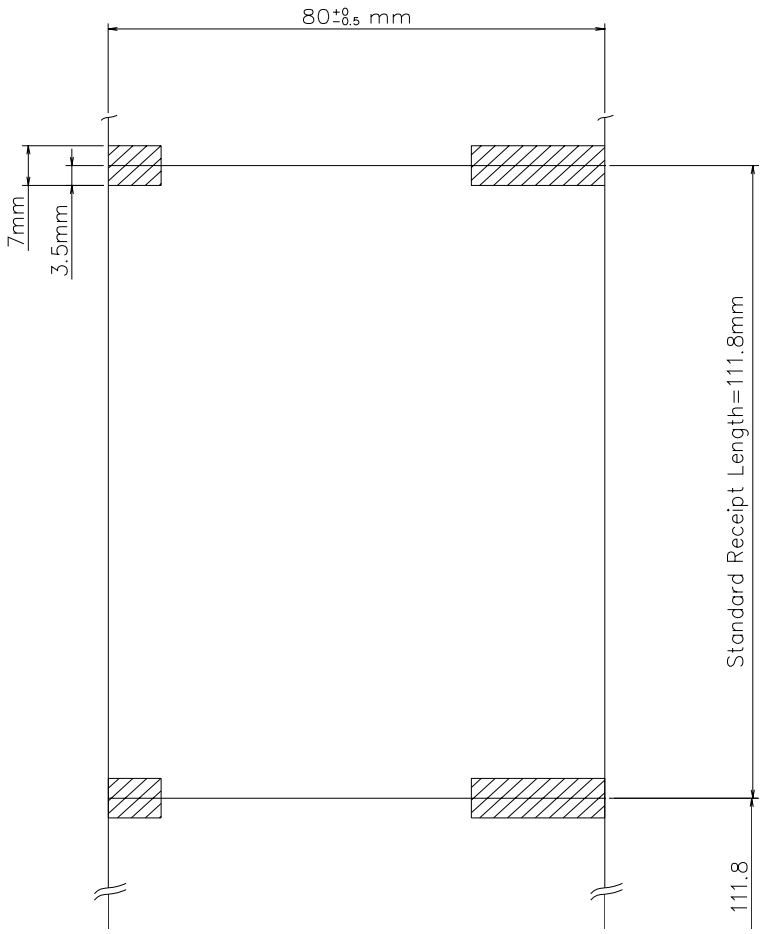



Fig.13. 3 Printing position of the black mark

- **Printing specification of the black mark**

1) Use black without dark or bright shades.
2) Use the oil ink. (no surface gloss)
3) Transmissivity: Less than 10%
4) Reflection ratio - PCS 0.9 or higher (Less than Mark GBase PCM II 900nm)
5) Thickness should take precedence over reflection ratio.(In case of 55g/m paper, the range of thickness should be between 0.054~0.062 mm)
6) The slippery gap between the black mark and the rule mark should be less than 0.5mm .

## Paper Handling Precautions

1) Store it away from high temperature and humidity
   If the paper is stored in a place where temperature is above 50℃ or humidity is above 90% RH, the coloring capability may deteriorate or the paper surface may inflate.

2) Refrain from exposing to direct sunlight
   The paper surface can be inflated if you expose it to direct sunlight or leave it under the fluorescent lamp for a long time.

3) Keep it away from organic solvents
   Paper color may change if the paper comes in contact with organic solvents or glues containing organic solvent.

4) Keep it away from plasticizer
   If the paper comes in contact with materials containing plasticizer, its coloring capability may deteriorate or de-coloring of the paper may occur.

5) Miscellaneous
   If the paper comes in contact with carbon copy paper or if the paper surface is scratched with a metallic object, de-coloring may occur.

### 13.1.2 Magnetic Card

#### Applicable Product

This purchase specification applies to magnetic identification card for MCRW test.

#### Card Specifications

The following table shows the physical specification of the ISO card.

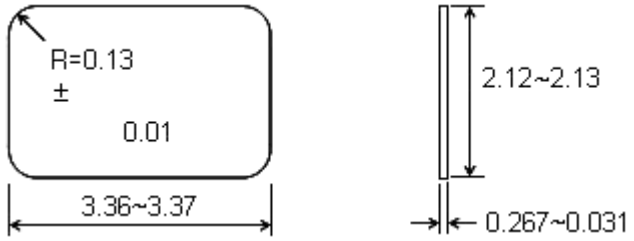
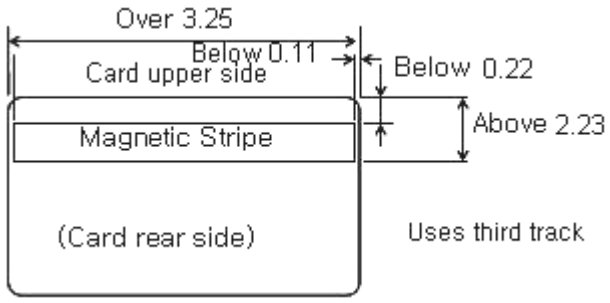
| Item | ISO Card (Unit : Inch) |
|---|---|
| Length |  |
| Card Bending |  |
| Magnetic Stripe Position |  |

Table 13.1 Physical specifications of the ISO magnetic card

## 13.2 Error Code Table

### 1) Journal Printer (Option)

| Error Code | Cause | Handling |
|---|---|---|
| 1910000 | Undefined error | 1.Reinitialized Journal printer and check again |
| 1910400 | The error of head right position | 1.After checking the head right position, try to reinitialized Journal printer and check again |
| 1910800 | The error of Paper charger sub assembly | 1.Check the Paper charger and status of supplied paper |
| 1912000 | Failed to print due to shortage of CR/LF | 1.Check if FFC cable is properly connected or short |
| 1912100 | Paper out when checked status of initializing | 1.Check if supplied paper is running out of or occurred jam in return path |
| 1914000 | Head overheat | 1.Turn off the power for a moment to slow down overheat of head and turn on the power |
| 1914100 | Paper jam error | 1.Remove the jammed paper and initialize |
| 9721010 | Failed to connect communication | 1.Check if communication cable is properly connected or right status by test machine |
| 9721012 | Failed to deliver data to control electronics | 1.Check if communication cable is properly connected or right status by test machine |
| 9721016 | Failed to receive data from control electronics | 1.Check if communication cable is properly connected or right status by test machine |
| 9721040 | Failed to produce Thread | |
| 9721080 | Failed to produce Event | |
| 9721122 | Failed to response of first initialization | |
| 9721123 | Failed to response of second initialization | |
| 9721124 | Failed to download thd font data | |
| 9721125 | Failed to try to print in case of Paper out | |

### 2) Receipt Printer

| Error Code | Cause | Handling |
|---|---|---|
| 2010100 | In case of detecting to be open lever of print head before printing receipt paper | 1.Close the lever of print head completely |
| 2010200 | In case of detecting to be overheated in print head before printing receipt paper | 1.Wait the time until the temperature of head adequately slow down and try to initialize |
| 2010300 | Paper jam occurs in return path before printing or cutting or discharging receipt paper | 1.Remove jammed paper between printer head and rollers |
| 2010400 | It is detected that paper is empty before printing receipt printer | 1.Replenish receipt paper<br>2.Check the status of sensor and its connctor |
| 2010500 | It is detected that paper is not properly set before printing | 1.Check the status of setting paper<br>2.Check the status of sensor and its connctor |
| 2010600 | Command is received while doing self-test | 1.After terminating self-test and initialize receipt printer |
| 2010700 | Receipt paper runs out of before printing | 1.Replenish receipt paper in paper charger<br>2.Check the status of Near End sensor and its connctor |
| 2010800 | It is detected that paper is not properly cut while operating | 1.Check the Cutter module<br>2.Check if printer head lever is properly close |
| 2010900 | Black mark is not properly detected in receipt paper before printing | 1.Check the status of Black mark sensor<br>2.Check if Dip switch # 6 is correctly set<br>(Dip switch # 6 is set by On in case of not using Black mark) |
| 2010A00 | The size of image print data is abnormal while printing image | 1.Check the AP version and initialize |
| 2080100 | In case of detecting to be open lever of print head after printing receipt paper | 1.Close the lever of print head completely |
| 2080200 | In case of detecting to be overheated in print head after printing receipt paper | 1.Wait the time until the temperature of head adequately slow down and try to initialize |
| 2080300 | Paper jam occurs in return path after printing or cutting or discharging receipt paper | 1.Remove jammed paper between printer head and rollers |
| 2080400 | It is detected that paper is empty after printing receipt printer | 1.Replenish receipt paper |

| Error Code | Cause | Handling |
|---|---|---|
| | | 2.Check the status of sensor and its connctor |
| 2080500 | It is detected that paper is not properly set after printing | 1.Check the status of setting paper<br>2.Check the status of sensor and its connctor |
| 2080600 | Command is received while doing self-test | 1.After terminating self-test and initialize receipt printer |
| 2080700 | Receipt paper runs out of after printing | 1.Replenish receipt paper in paper charger<br>2.Check the status of Near End sensor and its connctor |
| 2080800 | It is detected that paper is not properly cut while operating | 1.Check the Cutter module<br>2.Check if printer head lever is properly close |
| 2080900 | Black mark is not properly detected in receipt paper after printing | 1.Check the status of Black mark sensor<br>2.Check if Dip switch # 6 is correctly set<br>(Dip switch # 6 is set by On in case of not using Black mark) |
| 2080A00 | The size of image print data is abnormal while printing image | 1.Check the AP version and initialize |
| 9720000 | Failed to communicate with Receipt printer when connected to SP open | 1.Check if communication cable or com port is not connected |
| 2DN0000 | Failed to connect communication between Receipt printer and SP | 1.Check if communication cable or com port is not connected |
| 2080F00 | The firmware crashed | 1. Check whether the dip switch #1 is set to “ON” position<br>2. Update the firmware |
| 2080B00 | Margin setting error | 1. Check whether the default registry setting is changed<br>2. Reset the PTR SP |
| 2080C00 | Paper jammed at the exit of the slot | 1. Remove the jammed paper |
| 2080D00 | Paper jammed in the path | 1. Remove the jammed paper |
| 9720100 | Hardware error occurred before executing command | 1. Reset the PTR SP |

### 3) Card Reader

| Error Code | Cause | Handling |
|---|---|---|
| 3000000 | To shows that received command was undefined | |
| 3000100 | To show command parameter error | |
| 3000200 | The reception of the command that impossible to implementation | |
| 3000400 | To show that error data was included in command | |
| 3000500 | To show that a command, which requires the card movement, was executed before IC contacts were released from the card | |
| 3001000 | To show that the card was not carried to the specific location after specified number of trial for specified time during execution of command of carrying card in various ways | |
| 3001100 | To show that status signal for "shutter open"is not received while shutter is open. | |
| 3001200 | To show that the Sensor is damaged or more that one card is inside ICRW. | |
| 3001300 | To show that the card longer than 92mm is inserted into ICRW | |
| 3001400 | To show that the card shorter than 78mm is inserted into ICRW | |
| 3001500 | To show that data in F-ROM is damaged | |
| 3001600 | To show that the card staying inside ICRW was moved up to the point where status request information change. To show that card was inserted into the ICRW through rear side by external force | |
| 3001700 | To show that the card was not carried to the specific location after specified number of trial for specified time during execution of RETRIEVE command. | |
| 3001800 | To show that shutter open/close detection sensor(SW2) and card width check sensor(SW1) are not operating correctly. | |
| 3001900 | To show that a card was not inserted from the rear, even if 10 seconds had passed | |

| Error Code | Cause | Handling |
|---|---|---|
| | after the execution of BACK ENTRY command | |
| 3002000 | To show that track has parity error | |
| 3002100 | To show that read error has happened in Multiple magnetic read command. | |
| 3002200 | To show that write error is detected through write/verify procedure. | |
| 3002300 | To show that only SS,ES,LRC are contained in the track. (no retry) | |
| 3002400 | To show that the card has no magnetic track(no retry) | |
| 3002500 | To show that quality error(Jitter,Preamble,Postamble) has happended in write verify. | |
| 3002600 | To show that the track has no SS. | |
| 3002700 | To show that the track has no ES | |
| 3002800 | To show that the track has no LRC error | |
| 3002900 | To show that the discordance of write data has happened in write verify. | |
| 3003000 | To show that power down(or power cut in short instant)is detected(or being detected). | |
| 3003100 | To show that DSR signal was turned to OFF(communication is cut) | |
| 3004000 | To show that the card was pulled out form ICRW through entrance date when CAPTURE command is being executed. | |
| 3004100 | Failure at IC Contact solenoid or sensor ICD. | |
| 3004300 | Card could not be set to IC contack position/Failure at sensor PDI. | |
| 3004500 | ICRW lost sight of the card when ICRW completed to carrry the card to dhe rear position during the card acceptance, and ICRW ejected the card to entrance gate. | |
| 3004600 | To show that the ejected card has not been withdrawn during execution of Monitoring for removal command. | |
| 3005000 | Retract counter overflow. | |
| 3005100 | To show that Motor error has happened, through start/stop check in Initialize command. | |

| Error Code | Cause | Handling |
|---|---|---|
| 3005300 | To show that read error in Digital Decode Read Command. | |
| 3006000 | To show that there found abnormal condition on the power-line. | |
| 3006100 | The receiving error for ATR. | |
| 3006200 | To show that the specified protocol does not agree with that of ICC/SAM ICRW still connected. | |
| 3006300 | In case T=1 cards, after ATR receiving, IFS exchange is failed. ICRW detects time out. | |
| 3006400 | In case T=1 cards, after ATR receiving, IFS exchange is failed. ICRW detects protocol error. | |
| 3006500 | HOST tried to communicate with IC card without card activation. | |
| 3006600 | ICRW tried to activate with ICC/SAM, but the card returned ATR, which is not supported. | |
| 3006900 | ICRW tried to activate with ICC/SAM, but the card returned ATR, Which does not match EMV. | |
| 3007000 | Failure at F-ROM operation. | |
| 3007100 | Firmware of User program code area is wrong. | |
| 300B000 | Received the other command before executing Initialize command. | |
| 9723016 | Response time out error | |
| 9723017 | Send command time out error | |
| 9723019 | Polling down | |

### 4) Cash Dispenser

| Error Code | Cause | Handling |
|---|---|---|
| 4000000 | Received a command that the CDU does not have from the upper unit | 1. Check the CDU received command<br>2. Check the CDU firmware version and refer to specifications. |
| 4001100 | CS2 Dark detection during initializing or dispense reserved operation (Reject box mounting/dismounting) | 1. Initialize after mounting the reject box.<br>2. Check if the CS2 sensor cable is disconnected<br>3. Exchange a sensor after abnormal operating CS2 Sensor |
| 4001200 | CS3 Dark detection during initializing or Dispense reserved operation | 1. Remove the remaining notes or foreign objects on the gate<br>2. Check if the CS3 sensor bracket is bended.<br>3. Check if the CS3 sensor cable is disconnected<br>4. Exchange a sensor after abnormal operating CS3 Gate detecting sensor. |
| 4001300 | CS2 and CS3 Dark detection during initializing or dispense reserved operation | The same as #40011 and #40012 error handling |
| 4001400 | CS4A Dark detection during initializing or dispense reserved operation | 1. Remove the remaining notes and foreign objects at the position of the CS4A sensor<br>2. Check if the CS4A sensor cable is disconnected<br>3. Exchange a sensor after abnormal operating the CS4A Sensor |
| 4001500 | CS2 and CS4A Dark detection during initializing or dispense reserved operation (Reject box mounting/dismounting) | The same as #40011 and #40014 error handling |
| 4001600 | CS3 and CS4A Dark detection during initializing or dispense reserved operation | The same as #40011 and #40012 error handling |
| 4001700 | CS2, CS3 and CS4A Dark detection during initializing or dispense reserved operation | The same as #40011, #40012 and #40014 error handling |

| Error Code | Cause | Handling |
|---|---|---|
| 4001800 | CS4B Dark detection during initializing or dispense reserved operation | 1. Remove the remaining notes and foreign objects at the position of the CS4B sensor<br>2. Check if the CS4B sensor cable is disconnected<br>3. Exchange a sensor after abnormal operating the CS4B sensor |
| 4001900 | CS2, CS4B Dark Detection during In Initializing or Dispense reserved operation | The same as #40011 and #40018 error handling |
| 4001A00 | CS3 and CS4B Dark detection during initializing or dispense reserved operation | The same as #40011 and #40018 error handling |
| 4001B00 | CS2, CS3 and CS4B Dark detection during initializing or dispense reserved operation | The same as #40011, #40012 and #40018 error handling |
| 4001C00 | CS4A and CS4B Dark detection during initializing or dispense reserved operation | The same as #40014 and #40018 error handling |
| 4001D00 | CS2, CS4A and CS4B Dark detection during initializing or dispense reserved operation | The same as #40011, #40014 and #40018 error handling |
| 4001E00 | CS3, CS4A and CS4B Dark detection during initializing or dispense reserved operation | The same as #40012, #40014 and #40018 error handling |
| 4001F00 | CS2, CS3, CS4A and CS4B Dark detection during initializing or dispense reserved operation | The same as #40011, #40012 and #40014 error handling |
| 4002100 | CS11A Dark detection during initializing or dispense reserved operation | 1. Remove the remaining notes and foreign objects at the position of the CS11A sensor<br>2. Check if the CS11A sensor cable is disconnected .<br>3. Exchange a sensor after abnormal operating the CS11A sensor |

| Error Code | Cause | Handling |
|---|---|---|
| 4002200 | CS11B Dark detection during initializing or dispense reserved operation | 1. Remove the remaining notes and foreign objects at the position of the CS11B sensor<br>2. Check if the CS11B sensor cable is disconnected<br>3. Exchange a sensor after abnormal operating the CS11B sensor |
| 4002300 | CS11A and CS11B Dark detection during initializing or dispense reserved operation | The same as #40021 and #40022 error handling |
| 4002800 | CS13 Dark detection during initializing or Dispense reserved operation | 1. Remove the remaining notes and foreign objects at the position of the CS13 sensor<br>2. Check if the CS13 sensor cable is disconnected (CDU Board CN10 #1~4).<br>3. Exchange sensor if error occurs after checking CS13 sensor operation |
| 4002900 | CS11A and CS13 Dark detection during initializing or dispense reserved operation | The same as #40021 and #40028 error handling |
| 4002A00 | CS11B and CS13 Dark detection during initializing or dispense reserved operation | The same as #40022 and #40028 error handling |
| 4002B00 | CS11A, CS11B and CS13 Dark detection during initializing or dispense reserved operation | The same as #40021, #40022 and #40028 error handling |
| 4003000 | Main motor echo check(Initial recovery) | 1. Initialize<br>2. Check Main Motor Encoder Slit<br>3. Initialize after Power On/Off<br>4. Check Encoder Sensor CS8 BRKT<br>5. Check CS8 Sensor Cable<br>6. Change Main Motor Encoder Slit Sensor CS8 |

| Error Code | Cause | Handling |
|---|---|---|
| 4003300 | EEPROM Sum Check Error (CDU Information) | 1. Check CDU Information after reading CDU version<br>2. Initialize<br>3. Initialize after executing CDU Information Set('P') Command<br>4. Change CDU B/D |
| 4003400 | Error two sheets detecting sensor(CS5_1) for initializing | 1. Check CS5_1 Sensor Cable<br>2. Check second Dip Switch in CDU B/D<br>3. Change CS5_1 Sensor |
| 4003500 | Error two sheets detecting sensor(CS5_2) for initializing | 1. Check CS5_2 Sensor Cable<br>2. Check second Dip Switch in CDU B/D<br>3. Change CS5_2 Sensor |
| 4003700 | Error 2 sheets detecting sensor(CS5_1/CS5_2) for dispensing | 1. Check CDU Board Segment<br>2. Initialize<br>3. Read data of 'Read Double Sensor' Command |
| 4003800 | The cash dispenser module is deviated from the right position | 1. Push CDU module inside completely until it is locked |
| 4003900 | Gate operation sensor (CS3) error before initial recovery | 1. Initialize after removing notes or dust over Gate<br>2. Check CS3 Sensor BKRT<br>3. Check CS3 Sensor Cable<br>4. Exchange Sensor after abnormal operating CS3 Gate detecting Sensor<br>5. Exchange Reject Solenoid 1 |
| 4003A00 | When more than 5 sheets of cash dispensing is required during a test | 1. Check command that CDU is received<br>2. Check CDU EP ROM Version or specification |
| 4003B00 | CS21A dark detected (Initial recovery, On separated reject) | 1. Remove notes or dust in existence CS21A Sensor<br>2. Check CS21A Sensor Cable<br>3. Exchange Sensor after abnormal operating CS21A Sensor |
| 4003C00 | No cassette, during rejecting separated cassette (Separated reject) | 1. Set 1 Cassette<br>2. Check CS7 Sensor Cable<br>3. Exchange Sensor after abnormal operating CS7 Sensor |

| Error Code | Cause | Handling |
|---|---|---|
| 4003D00 | Dismount during rejecting separated cassette (Separated reject) | 1. Check notes in 1Cassette<br>2. Check 1 Cassette specification<br>3. Check CS7 Sensor Cable<br>4. Exchange Sensor after abnormal operating CS7 Sensor |
| 4003E00 | CS21B DARK Detected (Initial recovery, Separated reject) | 1. Remove notes or dust in existence CS21B Sensor<br>2. Check CS21B Sensor Cable<br>3. Exchange Sensor after abnormal operating CS21B Sensor |
| 4003F00 | CS21A,CS21B DARK Detected(Initial recovery, Separated reject) | 1. Remove notes or dust in existence CS21A , CS21B Sensor<br>2. Check CS21A, CS21B Sensor Cable<br>3. Exchange sensor after abnormal operating CS21A, CS21B Sensor |
| 4004100 | Error if re-driving is over 12 times (Separated rejection) | 1. Check notes in Reject Box<br>2. Rearrange notes in Cassette<br>3. Remove dust in CS21AB, CS31AB, CS41AB CS11AB Sensor<br>4. Check dust existing in CS5 Sensor Guide<br>5. Check dust existing in Main Motor Encoder Slit<br>6. Check index value of notes each cassette |
| 4004200 | CS13 < Required Notes(Separated rejection) | 1. Check notes dispensed and rejected<br>2. Remove notes jammed in CDU<br>3. Remove dust in CS13 Sensor<br>4. Exchange sensor after abnormal operating CS13 Sensor |
| 4004300 | Error if total reject is more than 40 sheets(Separated rejection) | 1. Check notes in Reject Box<br>2. Rearrange notes in Cassette<br>3. Remove dust in CS11AB, CS21AB, CS31AB, CS41AB Sensor<br>4. Check dust in existence CS5 Sensor Guide<br>5. Check notes index value |

| Error Code | Cause | Handling |
|---|---|---|
| 4004400 | Reject error if continuous 10 times (Separated rejection) | 1. Check notes in Reject Box<br>2. Rearrange notes in Cassette<br>3. Check dust in Main Motor Encoder Slit<br>4. Remove dust in CS21AB, CS31AB, CS11AB Sensor<br>5. Exchange CS8 Encoder Slit Sensor |
| 4004500 | CS13 > required sheet(Separated rejection) | 1. Check notes dispensed and rejected<br>2. Remove dust in CS13 Sensor<br>3. Exchange sensor after abnormal operating CS13 Sensor |
| 4004600 | Program error(Separated rejection) | 1. Initialize after Reset Power<br>2. Upgrade CDU Firmware or Re-download<br>3. Exchange CDU B/D |
| 4004700 | 1 CASSETTE MISFEED ERROR(Separated rejection) | 1. Check notes in 1 Cassette<br>2. Check Sensor(CS6) Poll<br>3. Check jam in 1 cassette and reload<br>4. Remove dust in CS11A, CS11B Sensor<br>5. Exchange 1 cassette box when there are many error |
| 4004900 | Dispensing 0 sheets required is error(Separated rejection) | 1. Check received command<br>2. Check communication cable<br>3. Check CDU Firmware Version |
| 4004A00 | TIME OUT (JAM)(Separated rejection) | 1. Remove jammed notes on CDU return path<br>2. Remove dust in CS11AB, CS21AB, CS31AB, CS41AB, CS4AB, CS13 Sensor<br>3. Install after rearranging notes in cassette |
| 4004B00 | Continuous 10 times error if note is long | 1. Check state of notes in reject box<br>2. Rearrange notes in cassette<br>3. Check Index of notes<br>4. Check foreign objects in the main motor encoder slit.<br>5. Replace the CS8 encoder slit sensor |
| 4004E00 | Detected the remaining notes on the return path during dispense reserved operation | 1. Initialize after removing the return path<br>2. Clean sensors on the return path (CS13) |

| Error Code | Cause | Handling |
|---|---|---|
| 4005100 | Received a request for over 121 notes dispensing on the CDU from the upper unit. | 1. Check the CDU received command<br>2. Check the abnormal communication cable.<br>3. Check the CDU firmwave version and refer to specifications. |
| 4005200 | The remaining notes at the sensor in front of the CST after dispense operation (CS11AB, CS21AB, CS31AB, CS41AB) | 1. Remove the remaining notes at a sensor in front of the CST<br>2. Realign notes in the cassette<br>3. Check abnormal clutch.<br>4. Check abrasion of the cassette box pick unit. |
| 4005400 | CS1 Sensor Table Search Error | |
| 4005500 | Timeout due to note's length error passed through the CS13 during dispense operation | 1. Remove a jammed note between the tray and CDU<br>2. Remove a jammed note at the position of the CS13 sensor<br>3. Remove a dust on the CS13 sensor |
| 4005600 | Abnormal operation of the gate solenoid 1 during dispense operation. | 1. Remove a jammed note on the gate<br>2. Remove notes in the reject box and remount the reject box<br>3. Check if the CS3 sensor bracket is bended.<br>4. Check if the CS3 sensor cable is disconnected<br>5. Exchange a sensor after abnormal operating CS3 Gate detecting sensor.<br>6. Replace the reject solenoid 1 |
| 4005700 | Sum check error of note index setting value in the CDU CST of EEPROM during initializing | 1. Read the CDU version to check CDU CST note index<br>2. Reinitialize<br>3. Initialize after executing the CDU Information Set('P') Command<br>4. Replace the CDU board |
| 4005800 | Receiving incorrect Index during setting the information of denomation. (Setting Index is beyond 240~250) | |

| Error Code | Cause | Handling |
|---|---|---|
| 4005900 | 2 Cassette not available during dispense reserved operation | 1. Mount 2 cassette<br>2. Check if the CS17 sensor cable is disconnected .<br>3. Exchange a sensor after abnormal operating the CS17 sensor . |
| 4005A00 | Mounting/demounting 2 Cassette during dispense operation | 1. Check notes' status in 2 Cassette<br>2. Check 2 cassette specifications<br>3. Check if the CS17 sensor cable is disconnected<br>4. Exchange a sensor after abnormal operating the CS17 sensor . |
| 4005B00 | 2 Cassette miss feed during dispense operation | 1. Check the remaining notes in 2 Cassette<br>2. Check if the remaining note sensor (CS16) is normal<br>3. Check a jammed note in 2 Cassette or remount it<br>4. Remove the dust on the CS21A and CS21B Sensors<br>5. Replace 2 cassette box when multiple error occurs |
| 4005C00 | Sensor dark in front of the CST except dispensing during dispense operation | 1. Remove a dust and foreign objects on CS11AB, CS21AB, CS31AB and CS41AB sensors.<br>2. Check the clutch operation (Life test command)<br>3. Check specifications of 3 Cassette FM Board Dip Switch (#2, #4, #6 On)<br>4. Check specifications of 4 Cassette FM Board Dip Switch (#3, #5, #6 On) |
| 4005D00 | Continuously detected 2 notes for three times or more during dispense operation (more than 7 times) | 1. Check notes' status in the reject box<br>2. Realign notes in the cassette<br>3. Check foreign objects at the position of the CS5 Sensor Guide<br>4. Check if the CS5 cable is disconnected |
| 4008100 | Received the wrong shutter command from the upper unit. | 1. Check the CDU received command<br>2. Check the abnormal communication cable.<br>3. Check the CDU firmwave version and refer to specifications. |

| Error Code | Cause | Handling |
|---|---|---|
| 4008200 | Failed to open the CDU shutter (failed ten times retry) | 1. Remove foreign objects in the shutter unit.<br>2. Check the shutter motor connection cable.<br>3. Check a connection status of the TS004 and TS005 sensor<br>4. Check the shutter cam operation. |
| 4008400 | Failed to close the CDU shutter (failed ten times retry) | 1. Remove foreign objects in the shutter unit.<br>2. Check the shutter motor connection cable.<br>3. Check a connection status of the TS004 and TS005 sensor.<br>4. Check the shutter cam's rotation operation. |
| 4008500 | When the command of CDU shutter open or close is received in case of not being set CDU shutter. | |
| 4008700 | Error failed to communicate with CDU shutter | |
| 4008800 | Error occurs when cassette with ID is not mounted | |
| 4008900 | Error occurs when the number of dispensed bills from cassette don't match with the number of detection by sensor | |
| 4008A00 | CS11AB Dark detection on transport path before dispense operation | 1. Remove the remaining notes and foreign objects at the position of the CS11AB sensor<br>2. Check if the CS11AB sensor cable is disconnected<br>3. Exchange a sensor after abnormal operating the CS11AB sensor |
| 4008B00 | CS21AB Dark detection on transport path before dispense operation | 1. Remove the remaining notes and foreign objects at the position of the CS21AB sensor<br>2. Check if the CS21AB sensor cable is disconnected<br>3. Exchange a sensor after abnormal operating the CS21AB sensor |

| Error Code | Cause | Handling |
|---|---|---|
| 4008C00 | CS31AB Dark detection on transport path before dispense operation | 1. Remove the remaining notes and foreign objects at the position of the CS31AB sensor<br>2. Check if the CS31AB sensor cable is disconnected<br>3. Exchange a sensor after abnormal operating the CS31AB sensor |
| 4008D00 | CS41AB Dark detection on transport path before dispense operation | 1. Remove the remaining notes and foreign objects at the position of the CS41AB sensor<br>2. Check if the CS41AB sensor cable is disconnected<br>3. Exchange a sensor after abnormal operating the CS41AB sensor |
| 4008E00 | CS4 Dark detection on transport path before dispense operation | 1. Remove the remaining notes and foreign objects at the position of the CS4 sensor<br>2. Check if the CS4 sensor cable is disconnected<br>3. Exchange a sensor after abnormal operating the CS4 sensor |
| 4008F00 | Error occurs when CS13 sensor regard hole in bill as wrong | |
| 4009000 | Mismatched number of check sheets | 1. Check dispensed check and reject check.<br>2. Remove a jammed note on the CDU.<br>3. Remove a dust or foreign objects on the CS13 sensor<br>4. Exchange a sensor after abnormal operating the CS13 sensor .<br>※ Reset number of check sheets after troubleshooting. |
| 4009100 | Reject error due to check skew during check dispense operation. | 1. Check a check's status in the reject box<br>2. Remove a dust and foreign objects on the CS31AB or CS41AB sensors.<br>3. Check the CIU Module Print Head.<br>4. Realign check sheets in the check cassette box.<br>※ Reset number of check sheets after troubleshooting. |

| Error Code | Cause | Handling |
|---|---|---|
| 4009200 | Reject error due to abnormal check interval skew during check dispense operation. | 1. Check a check's status in the reject box<br>2. Remove a dust and foreign objects on the CS31AB or CS41AB sensors.<br>3. Check the CIU Module Print Head.<br>4. Realign check sheets in the check cassette box.<br>5. Clean the pick up roller in the check cassette box.<br>※ Reset number of check sheets after troubleshooting. |
| 4009300 | Reject error due to long check sheet during check dispense operation. | The same as #40092 handling. |
| 4009400 | Reject error due to short check sheet during check dispense operation. | The same as #40092 handling. |
| 4009500 | Reject error due to 2 check sheets' pick up during check dispense operation | The same as #40092 handling. |
| 4009600 | Reject error due to the abnormal half of check during check dispense operation. | The same as #40092 handling. |
| 4009700 | Reject error due to abnormal check separation interval skew during check dispense operation. | The same as #40092 handling. |
| 4009800 | Abnormal CIU detecting sensor during check dispense operation | 1. Clean CS31AB and CS41AB, or remove foreign objects.<br>2. Check if the FM Board (3 CST or 4 CST) CN3 and CIU Sensor Cable are connected. |
| 4009900 | CIU communications response timeout error during check dispense reserved operation or initializing. | 1. Reinitialize<br>2. Check if the CIU communications serial cable is connected.<br>3. Check if the CIU power cable is connected. |
| 4009A00 | CIU communications response timeout error during check dispense reserved operation or initializing. | The same as #40099 handling. |

| Error Code | Cause | Handling |
|---|---|---|
| 4009B00 | Detected the CS31A and CS31B Dark during initializing or dispense reserved operation | 1. Remove the remaining notes and foreign objects at the position of the CS31A and CS31B sensors.<br>2. Check settings of 3 Cassette FM Board Dip Switch (#2, #4, #6 On)<br>3. Check if the CS31 and CS31B Sensor Cable are disconnected<br>4. Exchange a sensor after abnormal operating the CS31A, CS31B sensor |
| 4009C00 | Detected the CS31B Dark during initializing or dispense reserved operation | 1. Remove the remaining notes and foreign objects at the position of the CS31B sensor.<br>2. Check settings of 3 Cassette FM Board Dip Switch (#2, #4, #6 On)<br>3. Check if the CS31B and CS31B sensor cables are disconnected<br>4. Exchange a sensor after abnormal operating the CS31B. |
| 4009D00 | 3 Cassette not available during dispense reserved operation | 1. Mount 3 cassette<br>2. Check if the CDU Board CN6 and 3 Cassette FM Board CN1 are connected.<br>3. Check settings of 3 Cassette FM Board Dip Switch (#2, #4, #6 On)<br>4. Check if the CS37 sensor cables are disconnected (3 CST FM B/D CN3).<br>5. Exchange a sensor after abnormal operating the CS37 sensor . |
| 4009E00 | Mounting/demounting 3 Cassette during dispense operation | 1. Check notes' status in 3 Cassette<br>2. Check 3 cassette specifications<br>3. Check if the CDU Board CN6 and 3 Cassette FM Board CN1 are connected.<br>4. Check settings of 3 Cassette FM Board Dip Switch (#2, #4, #6 On)<br>5. Check if the CS37 sensor cable are disconnected (3 CST FM B/D CN3). |

| Error Code | Cause | Handling |
|---|---|---|
| | | 6. Exchange a sensor after abnormal operating the CS37 sensor . |
| 4009F00 | 3 Cassette miss feed during dispense operation | 1. Check the remaining notes in 3 Cassette<br>2. Check if the remaining note sensor (CS36) of 3 Cassette is normal.<br>3. Check a jammed note in 3 Cassette or remount it<br>4. Remove the dust on the CS31A and CS31B Sensors<br>5. Replace 3 cassette box when multiple errors occur. |
| 400A100 | Detected the CS9 Dark in Reject(Retract) box during initializing. | 1. Open the reject/retract box cover<br>2. Check if the CS9 sensor cable is disconnected.<br>3. Exchange a sensor after abnormal operating the CS9 sensor |
| 400A200 | When a note doesn't arrive from the tray to the throat entrance (CS10AB~CS14 (Delivery Jam). | 1. Remove a jammed note or foreign objects between the throat and the tray<br>2. Check if the CS10AB and CS14 sensor cable is disconnected.<br>3. Check the feed motor operation in the throat unit.<br>4. Exchange a sensor after abnormal operating the CS14 sensor . |
| 400A700 | When cam doesn't arrive at dispense position within regulated time (cam error) | |
| 400A800 | When cam doesn't arrive at delivery position within regulated time (cam error) | |
| 400AA00 | Failed during writing EEPROM data | 1. Retry after initialization.<br>2. Replace the CDU Board. |

| Error Code | Cause | Handling |
|---|---|---|
| 400AB00 | Disable to drive due to the remaining notes in the tray during initializing or dispense reserved operation.(CS10A and CS10B Dark detection) | 1. Remove the remaining notes or foreign objects in the tray.<br>2. Check if holders on the CS10A and CS10B sensors are bended.<br>3. If error occurs when checking CS10A/CS10B (CDU B/D CN2 #17~24) disconnection and operation, replace a sensor. |
| 400AD00 | Disable to detect notes in CS15 sensor during delivery operation | 1. Remove the remaining notes on the throat.<br>2. If error occurs when checking CS15 disconnection and operation, replace a sensor. |
| 400AE00 | No note in the tray before delivery or retract operation. | 1. If error occurs when checking CS (CDU B/D CN2 #17~24) disconnection and operation, replace a sensor.<br>2. Check the tray deliver position operation. |
| 400AF00 | Received the wrong life test command from the upper unit. | 1. Check the CDU received command<br>2. Check the abnormal communication cable.<br>3. Check the CDU firmware version and refer to specifications. |
| 400B000 | Opened shutter during dispense operation. | 1. Check the shutter cam's rotation.<br>2. If error occurs when checking TS004 disconnection and operation, replace a sensor. |
| 400BA00 | CS1 sensor of reject box entrance is detected as dark during initialization or before dispense operation | |
| 400BB00 | Bill jam on CS1 sensor of reject box entrance during dispense operation | |
| 400BC00 | Communication error-Command Length doesn't match. | |
| 400BD00 | Bill rejection error (Normal recognition for short bill-CS4) | |
| 400BE00 | Bill rejection error (Normal recognition for long bill-CS4)/CS4 Jam. | |

| Error Code | Cause | Handling |
|---|---|---|
| 400C100 | 1 Cassette Jam during dispense operation (1 CST Encoder Error). | 1. Remove a jammed note in 1 Cassette.<br>2. Mount 1 cassette box after realigning notes in 1 cassette box.<br>3. Remove foreign objects on 1 Cassette Clutch Encoder Slit.<br>4. Replace 1 cassette box when multiple errors occur. |
| 400C200 | 2 Cassette Jam during dispense operation (2 CST Encoder Error). | 1. Remove a jammed note in 2 Cassette.<br>2. Mount 2 cassette box after realigning notes in 1 cassette box.<br>3. Remove foreign objects on 2 Cassette Clutch Encoder Slit.<br>4. Replace 2 cassette box when multiple errors occur. |
| 400C300 | 3 Cassette Jam during dispense operation (3 CST Encoder Error). | 1. Remove a jammed note in 3 Cassette.<br>2. Mount 3 cassette box after realigning notes in 1 cassette box.<br>3. Remove foreign objects on 3 Cassette Clutch Encoder Slit.<br>4. Replace 3 cassette box when multiple errors occur. |
| 400C400 | 4 Cassette Jam during dispense operation (4 CST Encoder Error). | 1. Remove a jammed note in 4 Cassette.<br>2. Mount 4 cassette box after realigning notes in 1 cassette box.<br>3. Remove foreign objects on 4 Cassette Clutch Encoder Slit.<br>4. Replace 4 cassette box when multiple errors occur. |
| 400C700 | CS 14 Dark detection during initializing or dispense reserved operation. | 1. Remove the remaining notes and foreign objects at the position of the CS 14 sensor<br>2. If error occurs when checking CS 14 disconnection and operation, replace a sensor. |
| 400C800 | CS 15 Dark detection during initializing or dispense reserved operation. | 1. Remove the remaining notes and foreign objects at the position of the CS 15 sensor<br>2. If error occurs after checking CS 15 disconnection and operation, replace a sensor. |

| Error Code | Cause | Handling |
|---|---|---|
| 400CA00 | CS14 Dark detection during deliver reserved operation. | The same as #400C7 handling |
| 400CB00 | CS 15 Dark detection during deliver reserved operation. | The same as #400C8 handling |
| 400CC00 | Detected the remained notes on the sensors in front of cassettes during re-driving. | |
| 400D000 | Feeding time out due to jam (CS14) around throat assembly during delivery operation | 1. Remove a jammed note or foreign objects between the throat and the tray<br>2. Check if the CS 14 sensor cable is disconnected.<br>3. Check the feed motor operation in the throat unit.<br>4. Exchange a sensor after abnormal operating the CS 14 sensor . |
| 400D100 | Feeding time out due to jam (CS14~15) around throat assembly during delivery operation | 1. Remove a jammed note in the throat.<br>2. Check external light source of the CS 15 sensor.<br>3. Check the feed motor operation in the throat unit .<br>4. If error occurs when checking CS 14 and CS 15 sensor operation, replace a sensor. |
| 400D200 | Feeding time out due to jam (CS10AB) around throat assembly during delivery operation | 1. Remove a jammed note in the throat.<br>2. Check external light source of the CS10 AB sensor.<br>3. Check the feed motor operation in the throat unit .<br>4. If error occurs when checking CS10 AB sensor operation, replace a sensor. |
| 400D300 | The remaining notes on the tray during delivery operation (some notes remaining on CS10AB) | The same as #400D2 handling. |
| 400D400 | The remaining notes on the tray during delivery operation (some notes remaining on CS14) | 1. Remove a jammed note in the tray<br>2. Check external light source of the CS14 sensor.<br>3. If error occurs when checking CS14 sensor operation, replace a sensor |
| 400D500 | The remaining notes on the tray during delivery operation (some notes remaining on CS10AB) | The same as #400D2 handling. |

| Error Code | Cause | Handling |
|---|---|---|
| 400D600 | Detecting both CS10AB and CS15 of bills during delivery. | |
| 400D700 | DIP Switch Setting Miss (Dispense Mode Setting Miss) | |
| 400D800 | CS41A and CS41B Dark detection during initializing or dispense reserved operation | 1. Check 4 Cassette specifications for CDU Version.<br>2. Remove the remaining notes and foreign objects at the position of the CS41A and CS41B sensors.<br>3. Check if 3 Cassette FM B/D CN2 and 4 Cassette FM B/D CN1 are connected.<br>4. Check settings of 4 Cassette FM Board Dip Switch (#3, #5, #6 On)<br>5. Check if the CS41A and CS41B sensor cables are disconnected (4 CST FM B/D CN3).<br>Exchange a sensor after abnormal operating the CS41A and CS41B sensor |
| 400D900 | Simultaneous Dark detection in both the tray (CS10) and throat (CS14/CS15). | 1. Remove the remaining notes and foreign objects in the tray and throat unit.<br>2. Check each sensor (refer to the above description) |
| 400DB00 | Detected the CS41A Dark during initializing or dispense reserved operation | 1. Check 4 Cassette specifications for CDU Version.<br>2. Remove the remaining notes and foreign objects at the position of the CS41A sensor.<br>3. Check if 3 Cassette FM B/D CN2 and 4 Cassette FM B/D CN1 are connected.<br>4. Check settings of 4 Cassette FM Board Dip Switch (#3, #5, #6 On)<br>5. Check if the CS41A sensor cable is disconnected (4 CST FM B/D CN3).<br>6. Exchange a sensor after abnormal operating the CS41A sensor. |

| Error Code | Cause | Handling |
|---|---|---|
| 400DC00 | CS41B Dark detection during initializing or dispense reserved operation | 1. Check 4 Cassette specifications for CDU Version.<br>2. Remove the remaining notes and foreign objects at the position of the CS41B sensor.<br>3. Check if 3 Cassette FM B/D CN2 and 4 Cassette FM B/D CN1 are connected.<br>4. Check settings of 4 Cassette FM Board Dip Switch (#3, #5, #6 On)<br>5. Check if the CS41B sensor cable is disconnected (4 CST FM B/D CN3).<br>6. Exchange a sensor after abnormal operating the CS41B sensor. |
| 400DD00 | 4 Cassette not available during dispense reserved operation | 1. Mount 4 cassette<br>2. Check if 3 Cassette FM B/D CN2 and 4 Cassette FM B/D CN1 are connected.<br>3. Check settings of 4 Cassette FM Board Dip Switch (#3, #5, #6 On)<br>4. Check if the CS37 sensor cables are disconnected (4 CST FM B/D CN3).<br>5. Exchange a sensor after abnormal operating the CS47 sensor . |
| 400DE00 | Mounting/demounting 4 Cassette during dispense operation | 1. Check notes' status in 4 Cassette<br>2. Check 4 cassette specifications<br>3. Check if 3 Cassette FM B/D CN2 and 4 Cassette FM B/D CN1 are connected.<br>4. Check settings of 4 Cassette FM Board Dip Switch (#3, #5, #6 On)<br>5. If error occurs when checking the CS47's (4 CST FM B/D CN3) disconnection and operation, replace a sensor. |

| Error Code | Cause | Handling |
|---|---|---|
| 400DF00 | 4 Cassette miss feed during dispense operation | 1. Check the remaining notes in 4 Cassette<br>2. Check if the 4 Cassette remaining note sensor (CS46) is normal.<br>3. Check a jammed note in 4 Cassette or remount it<br>4. Remove the dust on the CS41A and CS41B sensors.<br>5. Replace 4 cassette box when multiple error occur. |
| 400E000 | Dark light sensor test error (CS11A, CS11B, CS4) during initializing. | 1. Check if each sensor is mounted.<br>2. If error occurs when checking CS11A cable operation, replace a sensor.<br>3. If error occurs when checking CS11B cable operation, replace a sensor.<br>4. If error occurs when checking CS4 cable operation, replace a sensor. |
| 400E100 | Dark light sensor test error (CS13) during initializing. | 1. Check if a sensor is mounted.<br>2. If error occurs when checking CS13(CDU B/D CN10 #1~4) cable operation, replace a sensor. |
| 400E200 | Dark light sensor test error (CS21A, CS21B) during initializing. | 1. Check if each sensor is mounted.<br>2. If error occurs when checking CS21A (cable operation, replace a sensor.<br>3. If error occurs when checking CS21Bcable operation, replace a sensor. |
| 400E300 | Dark light sensor test error (CS31A, CS31B) during initializing. | 1. Check if each sensor is mounted.<br>2. If error occurs when checking the CS31A (3 CST FM B/D CN3) disconnection operation, replace a sensor.<br>3. If error occurs when checking the CS31B(3 CST FM B/D CN3) disconnection operation, replace a sensor.<br>4. Check if the CDU Board CN6 and 3 Cassette FM Board CN1 are connected.<br>5. Check settings of 3 Cassette FM Board Dip Switch (#2, #4, #6 On) |

| Error Code | Cause | Handling |
|---|---|---|
| 400E600 | Dark light sensor test error (CS41A, CS41B) during initializing. | 1. Check the CDU information setting (4 Cassettes).<br>2. Check if each sensor is mounted.<br>3. If error occurs when checking the CS31B(4 CST FM B/D CN3) disconnection operation, replace a sensor.<br>4. Check if 3 Cassette FM B/D CN2 and 4 Cassette FM B/D CN1 are connected.<br>5. Check settings of 4 Cassette FM Board Dip Switch (#3, #5, #6 On)<br>6. If error occurs when checking the CS31A (4 CST FM B/D CN3) disconnection operation, replace a sensor. |
| 400E700 | Dark Light Test Error (CS10, CS9) during initializing | 1. Check if each sensor is mounted.<br>2. If error occurs when checking CS 10 disconnection operation, replace a sensor.<br>3. If error occurs when checking CS 9 disconnection operation, replace a sensor. |
| 400E800 | Dark light sensor test error (CS14, CS10) during initializing. | 1. Check if each sensor is mounted.<br>2. If error occurs when checking CS14 cable operation, replace a sensor.<br>3. If error occurs when checking CS10 cable operation, replace a sensor. |
| 400EA00 | Dark light sensor test error (CS18,28,38,48).during initializing. | |
| 400EB00 | Not supporting the command for Auto Sensor. | |
| 400EC00 | CS4 Sensor is abnormal during auto dimming process. | |
| 400ED00 | CS10A or CS10B Sensor is abnormal during auto dimming process. | |
| 400EE00 | CS13 Sensor is abnormal during auto dimming process. | |
| 400EF00 | Bill is retracted during INITIALIZE COMMAND | |
| 400F000 | Disabled to drive due to throat jam during forced initialization. | 1. Remove the remaining notes and foreign objects in the throat unit. |

| Error Code | Cause | Handling |
|---|---|---|
| 400F200 | Not work by detecting CS15 during Retract/Reserve/Initialization. | |
| 400F300 | Time out due to Jam (CS15) during initializing or retract process. | |
| 400F400 | Disable to drive due to continuous CS14~CS10AB Dark during forced initialization or retract operation (jam) | The same as #400F3 handling |
| 400F500 | Disable to drive due to continuous CS10 Dark during forced initialization or retract operation (jam) | The same as #400F3 handling |
| 400F600 | Failed to fall down bills during forced initializing and retract operation | 1. Remove the remaining notes and foreign objects in the throat unit.<br>2. If error occurs when checking disconnection operation, replace a sensor. |
| 400F700 | Continuously detected note in CS15 during retract operation | The same as #400F3 handling |
| 400F800 | Time out due to Jam (CS14) during initializing or retract process. | 1. Remove the remaining notes and foreign objects in the throat unit. |
| 400F900 | Some bills are taken out during delivery operation | |
| 400FA00 | Invalid ID of 1st cassette is requested to dispense | |
| 400FB00 | Invalid ID of 2nd cassette is requested to dispense | |
| 400FC00 | Invalid ID of 3rd cassette is requested to dispense | |
| 400FD00 | Invalid ID of 4th cassette is requested to dispense | |
| 400FE00 | Reject transaction happens again during bundle reject mode. | |
| 400FF00 | Enforcedly remove cash during reserve/retract operation (subnormal exit) | |

| Error Code | Cause | Handling |
|---|---|---|
| 9712000 | Unable to create INI file | |
| 9712100 | Unable to read file | |
| 9712200 | Unable to write file | |
| 9712300 | Unable to close file | |
| 9712400 | Unable to delete file | |
| 9712500 | Unable to copy file | |
| 9712600 | Unable to create directory | |
| 9719000 | In case other command is executed in Cash Unit Exchange | |
| 9719100 | In case it is not eh Cash Unit Exchange | |
| 9719200 | Cash dispenser service is already cash in state | |
| 9719300 | In case it is not the status of Cash In | |
| 9719400 | In case the ID of cassette don't match | |
| 9719500 | In case the cassette counting don't match | |
| 9719600 | In case the number of cassette don't match | |
| 9719700 | In case the dispensed bills are different from the requested ones. | |
| 9719800 | In case two ID are same in cassette | |
| 971A000 | In case the dispensed denominations are different from the requested ones. | |
| 971A100 | In case the dispensed currency is different from the requested one. | |
| 971A200 | Cassette Off Position. Not dispensable from cassette = ><br>1. Can't dispense the number of bills requested from the customer.<br>2. No cassette to dispense the bill<br>3. Reject bin is missing or full. | 1. Check the value during "WFS_CMD_CDM_DENOMINATE" or "WFS_CMD_CDM_DESPENSE"<br>2. Replenish the cassette with bill again.<br>Or reset the number of bill.<br>3. Check whether the reject bin is mounted. |

| Error Code | Cause | Handling |
|---|---|---|
| | | Or clear the reject bin. |
| 971A300 | In case requested bill counts are exceeded the maximum count | |
| 971A400 | In case requested coin counts are exceeded the maximum count | |
| 971A500 | Unable to define Mix method | |
| 971B000 | There isn't any bills on stacker | |
| 971C000 | In case that unsupported command is executed | |
| 971DX00 | In case partial bills only are dispensed from the requested bills. (X is the number of cassette) | |
| 9744700 | Cassette 1 misfeed | |
| 9745B00 | Cassette 2 misfeed | |
| 9749F00 | Cassette 3 misfeed | |
| 9747C00 | Cassette 4 misfeed | |
| 9740010 | Fail to open port | |
| 9741400 | Dark light sensor error (CS4) during idle status of cash dispenser | |
| 9742800 | Dark light sensor error (CS13) during idle status of cash dispenser | |
| 974BA00 | Dark light sensor error (CS1) during idle status of cash dispenser | |
| 9742300 | Dark light sensor error (CS11A, CS11B) during idle status of cash dispenser | |
| 9743F00 | Dark light sensor error (CS21A, CS21B) during idle status of cash dispenser | |
| 9749B00 | Dark light sensor error (CS31A, CS31B) during idle status of cash dispenser | |

| Error Code | Cause | Handling |
|---|---|---|
| 974D800 | Dark light sensor error (CS41A, CS41B) during idle status of cash dispenser | |
| 9740020 | Fail to produce file | |
| 9740025 | Fail to copy file | |
| 9740101 | In case of being selected cassette not dispensed | |
| 4DN0000 | Abnormal communication | |
| 4DN0100 | Abnormal response from EP | |

## 5) Etc

| Error Code | Cause | Handling |
|---|---|---|
| 9701010 | Failed to connect communication between SP of PIN and EP of one | 1.Check if communication cable or com port is not connected |
| 9701012 | Failed to deliver to data of EPP's SP | 1.Check if communication cable or com port is not connected |
| 9701016 | Received data time out of EPP | 1.Check if communication cable or com port is not connected |
| 9701017 | Delivered data time out of EPP | 1.Check if communication cable or com port is not connected |
| 9701031 | Failed to read Register of EPP | |
| 9701040 | Failed to produce Thread of EPP | |
| 9701111 | BCC error of EPP | Check BCC logic of EPP |
| 970401D | Failed to connect to SPL | Check if PncComm.dll and ComMonitor.exe files are available |
| 9707012 | Failed to receive data of VFD | |
| 9707082 | Failed to deliver the message about Fire Event | |